No. 16-1286

United States Court of Appeals for the Federal Circuit

MACROPOINT, LLC,

Plaintiff-Appellant,

v.

FOURKITES, INC.,

Defendant-Appellee,

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF OHIO
JUDGE PATRICIA A. GAUGHAN, CASE NO. 1:15-CV-102

APPELLANT'S OPENING BRIEF

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March 3, 2016

CERTIFICATE OF INTEREST

1. The full name of every party represented by me is: MacroPoint, LLC.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is: N/A.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party represented by me are: N/A.

4. The names of all law firms and the partners or associates that appeared for the party now represented by me in the trial court or agency or are expected to appear in this court are:

> Fish & Richardson P.C.: Ahmed J. Davis, Craig E. Countryman, and Jared A. Smith
>
> Thompson Hine LLP: Timothy J. Coughlin, Carolyn M. Cole, and Hope Y. Liu
>
> Benesch, Friedlander, Coplan, & Aronoff: Michael P. Sherban and Risto Pribisich

Dated: March 3, 2016

/s/ Craig E. Countryman
Craig E. Countryman

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STATEMENT OF RELATED CASES

There has been no prior appeal to the Federal Circuit or any other appellate court in this case. There is no case known to counsel to be pending in this or any other court that will directly affect or be directly affected by this Court's decision in the pending appeal.

STATEMENT OF JURISDICTION

The district court entered its order dismissing this case under Fed. R. Civ. P. 12(b)(6) and holding all claims of the patents-in-suit invalid under 35 U.S.C. § 101 on November 6, 2015. (A1-14.) MacroPoint timely filed its notice of appeal on December 3, 2015, within the 30-day period set by Fed. R. App. P. 4(a)(1). (A721-22.) This Court thus has jurisdiction under 28 U.S.C. § 1295.

STATEMENT OF THE ISSUES

1. Whether the district court's judgment invalidating the claims under 35 U.S.C. § 101 should be reversed where:

   a. the claims are directed to a specific method of the real-time monitoring of freight by obtaining location information from a source other than a device in the truck;

   b. the claims do not resemble any long-standing human activity that existed before the invention and do not preempt other computer-implemented ways of monitoring freight; and

   c. the claims provide a technological solution to a problem endemic to prior art technologies.

2. Alternatively, whether the case should be remanded for further considerations where:

   a. the district court analyzed only one claim yet invalidated all 94 claims of the five patents-in-suit; and

   b. the district court never substantively addressed MacroPoint's expert testimony establishing that the invention was not conventional, did not preempt other methods of monitoring freight, differed from the prior art, and solved a unique technological problem.

INTRODUCTION

This decision below is an overzealous extension of *Alice* that, if allowed to stand, would render virtually any software invention patent-ineligible. The invention is a technology-driven solution to long-existing problems in tracking freight. Prior systems obtained a truck's location from either sporadic contact with the driver or a pre-installed device in the truck. This created headaches for shippers and customers, because each trucking company had its own system, making it hard to ascertain the location of multiple shipments and manage their delivery. MacroPoint solved this problem by capitalizing on the fact that truck drivers carry cell phones and other communication devices, whose locations can be determined by third parties like a wireless provider. MacroPoint's software monitors a device's location information from that third party, correlates the device to a truck and, after obtaining the driver's consent, and presents a shipper with the real-time locations of all shipments. The district court, however, invalidated MacroPoint's patents under § 101, concluding that the invention was directed to the abstract idea of tracking freight.

The district court was wrong. The claims are limited to MacroPoint's novel approach, which differed from pre-existing human behavior and prior art. It was improper to invalidate the claims by describing them at a high level of generality while ignoring their detailed limitations on how the numerous computers, machines and devices interact. The claims do not preempt freight tracking. If that is not enough to make them patent-eligible, there is no limiting principle to save any software claim.

<u>STATEMENT OF THE FACTS</u>

I. <u>The Problem in the Art</u>: No Efficient Way to Continuously Monitor a Vehicle's Location and Make the Information Easily Accessible to Shippers.

Several methods of freight tracking were available before the invention, but none allowed shippers to continuously monitor their goods in real time. Earlier systems from the 1970s and 1980s relied on truck drivers to reliably report their locations by calling their freight company using a landline telephone at a rest stop or restaurant. (A336.) An operator at the freight company would manually record the driver's location and, if a shipper wanted to locate its goods, it had to affirmatively contact whichever freight company was transporting them and inquire about the vehicle's last known location. (*Id.*)

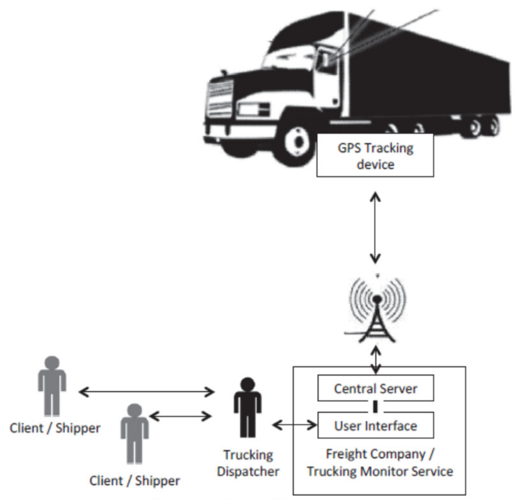
This approach had several obvious drawbacks. The updates were infrequent as drivers could only report their location when they stopped, yet shippers and carriers each wanted to minimize stops to more efficiently deliver the goods. (A336.) Location information was often hours out of date. (*Id.*) Manual reporting introduced errors because the parties relied on a driver to correctly report the truck's location and the operator to reliably and correctly record it. (*Id.*) What little location information existed was difficult for shippers or their customers to access. Each trucking company kept information about only its own trucks, so a shipper that did not know who was transporting its package or that used multiple trucking companies had no single place to access location information. (*Id.*)

Trucking companies attempted to address these problems in the 1990s by installing specialized equipment in their own trucks to facilitate tracking. One approach was "event-based," where the device in the truck sent periodic updates when particular events occurred. (A336-39.) An example was a United Parcel Service system, which used the device below for capturing the recipient's signature that, when plugged into a base, transmitted a delivery message to the trucking company. (A337.)

This technology reduced the errors from manual location reporting and recording, but was not a complete solution. (A337.) No continuous, real-time location information was available; the system instead provided discrete reports of where the vehicle had been in the past. (*Id.*) The system was also limited to one company; shippers still had no single integrated source of real-time information about all their shipments. (*Id.*)

Another approach involved installing dedicated equipment into each vehicle, which reported the vehicle's location by GPS, cellular communication, or other transmission method. (A27 at 1:31-36; A343-46.) The structure of one such conventional system is shown below—a GPS device in the truck reports its location to the trucking company. Shippers using this system to track a particular shipment's

location were required to communicate individually with each trucking company or independent driver with regard to that single load. (A345-46.)



Conventional System

These conventional systems still had problems. Each trucking company used its own system, making it difficult for a shipper to track its shipments if it used multiple freight companies or was a small-volume shipper. (A27 at 1:37-43; A348-49.) Each system was tied to a particular tracking technology (*e.g.*, GPS or cellular), making it incompatible with other systems that used a different technology. (A350-51.) Each system obtained the location information from the device in the truck, (A27 at 1:31-36; A347-48), which could be problematic if, for example, the vehicle was on an isolated stretch of road where it could not transmit its location. These technologies also could be prohibitively expensive for smaller trucking companies because the information was available only for a flat monthly fee and the cost per vehicle was exorbitant unless the shipper had many vehicles. (A27 at 1:37-44; A348-49.) And the information simply was not available from independent truckers.

II. <u>MacroPoint's Solution</u>: a System that Obtains Location Information from a Third Party to Continuously Monitor Vehicles.

MacroPoint developed an entirely different and novel approach to "tracking freight," one that provides both continuous location information and allows shippers to monitor shipment location easily across multiple trucking companies. MacroPoint leveraged the fact that drivers typically carry cell phones or other "communications devices" that can be used to monitor their location. (A339.) Independent third-party location providers (like AT&T, Verizon, or Google) collect this information from millions of devices, regardless of which particular trucking company or trucker is involved. (*Id.*) In one example of the invention, each device can be correlated to a particular truck by matching the device to a driver and thus to the truck of interest. The monitoring technology can obtain the location of the phone or other communication device (and thus the truck) from the third party (with the driver's consent) and can, in turn, provide continuous, real-time location information to shippers and customers about all shipments in one integrated service. (A352-77.)

Figure 3 of the patents-in-suit shows an example of how MacroPoint's invention can be implemented. A third-party location information provider (like AT&T Wireless or Verizon) can determine the location of a communication device using GPS or radiolocation techniques that analyze the device's position based on its relationship to surrounding cellular towers. (A30 at 7:1-8:13.) The system then takes the device's location and correlates it to a particular truck using computers

programmed with specific and custom "correlation logic" and additional information that indicates which driver is in which vehicle. (A18; A29 at 5:50-6:50.) The system also secures the driver's consent by using computers programmed with "notification logic," which informs the driver that his location may be seen by others, and "validation logic," which ensures that the driver consents to sharing his location. (A22-23, A30-32 at 8:26-10:46, 12:48-14:45.) A shipper or customer can then request or receive the truck's location from MacroPoint. (A29 at 5:23-49.)

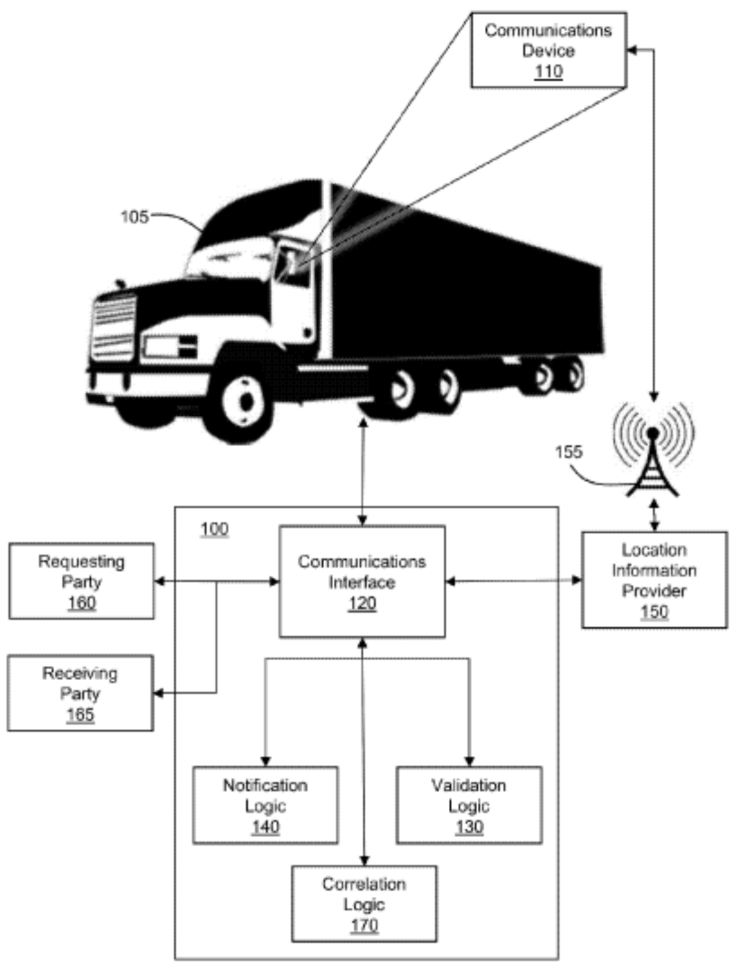


Figure 3

The invention provides several advantages over prior art systems. It provides

continuous real-time information about any truck's location, allowing a shipper to know exactly where its goods are at any time. It allows shippers to go to a single source to obtain information about *all* shipments across *all* trucking companies: a company like MacroPoint can aggregate all the data from different third-party location providers and present it in an efficient manner. The system also can process location data from providers using multiple and distinct types of tracking technology—*e.g.*, GPS or radiolocation—unlike prior art systems in which each trucking company's system was limited to a single technology. (A30 at 8:6-13; A360-63; A350-51.)

These unique attributes of MacroPoint's invention are reflected in the claims of the five patents-in-suit—U.S. Patents 8,604,943; 9,070,295; 9,082,097; 9,082,098; and 9,087,313. For example, claim 1 of the '943 patent covers a method of determining the location of freight by correlating it to a communication device, obtaining consent from the device's user to monitor his location, and obtaining the location of the freight from a third-party location information provider rather than from the device itself:

> 1. A computer implemented method for indicating location of freight carried by a vehicle, the method comprising:
>
> correlating the freight to a communications device;
>
> receiving a first signal including data representing a request for information regarding the location of the freight;
>
> transmitting to the communications device a second signal including data that prompts an automated message to be communicated to a user of the communications device, the automated message representing a notice

> communicating to the user of the communications device that the location information of the communication device will be obtained;
>
> receiving from the communications device a third signal including data indicative of consent from the user to the obtaining of the location information of the communications device;
>
> transmitting a fourth signal to a location information provider, the fourth signal including data representing a request for location information of the communications device, wherein the location information provider corresponds to a party or device other than the communications device and the location information provider corresponds to at least one of:
>
>> a wireless service provider providing wireless service to the communications device,
>>
>> a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and
>>
>> a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider;
>
> receiving a fifth signal from the location information provider, the fifth signal including data representing the location information of the communications device;
>
> correlating the location information of the communications device to the location of the freight based at least in part on the correlation between the freight and the communications device; and
>
> transmitting a sixth electronic signal including data representing the location of the freight.

(A36-A37 at 20:63-21:38.) Claims 2 and 3 of the '943 patent focus on the manner in which the device's location is tracked. Claim 2 requires non-GPS tracking, and claim 3 further specifies using specific cellular techniques:

> 2. The method of claim 1, wherein the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.
>
> 3. The method of claim 1, wherein the location information of the communications device is originally obtained using a method including at least one of:
>
> > advance forward link trilateration (AFLT),
> >
> > observed time difference (OTD),
> >
> > Cell-ID (CID),
> >
> > and a range of locations corresponding to a transmission range of a single radio tower.

(A37 at 21:39-51.) These claims stand in stark contrast to the prior art that used pre-installed GPS equipment to follow a truck's location. (*See e.g.*, A343-44.)

Other claims are directed to a system of machines that are specifically programmed to monitor the location of vehicles or freight. For example, claim 11 of the '098 patent is directed to a system of machines that includes a "communications interface" that requests, receives, and delivers information data from a third-party location provider about the location of a communications device, along with "correlation logic" that correlates a device to a particular vehicle and logic to confirm consent:

> 11. A machine or group of machines embodying a system for monitoring location of at least one of a vehicle or freight carried by the vehicle, the system comprising:
>
> a logic configured to determine whether consent was given to transmit location information of a communications device;

> a correlation logic configured to correlate, by a CPU, the location of the at least one of the vehicle or the freight carried by the vehicle with the location information of the communications device based at least in part on a correlation between the at least one of the vehicle or the freight carried by the vehicle and the communications device; and
>
> a communications interface configured to communicate electronic signals including:
>
>> a location request signal received from a requesting party including data representing a request for information regarding the location of the at least one of the vehicle or the freight carried by the vehicle,
>>
>> a location information request signal transmitted to a location information provider corresponding to a party or device other than the communications device including data representing a request for location information of the communications device,
>>
>> a location information signal received from the location information provider including data representing the location information of the communications device, and
>>
>> a location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle to cause a representation of the location of the vehicle or the freight carried by the vehicle by a remote device.

(A110 at 22:26-57.) Dependent claims 13 and 14 add the further requirements that location be tracked using either a GPS receiver (claim 13) or a technique that does not require a GPS receiver (claim 14):

> 13. The system of claim 11, wherein the location information of the communications device is originally obtained using a method including a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.
>
> 14. The system of claim 11, wherein the location information of the communications device is originally obtained using a method including a

> technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

(A111 at 23:4-13.) Alternatively, dependent claims 18-20 require that the vehicle's location is displayed as either a latitude and longitude, a city and state, or on a map:

> 18. The system of claim 11, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as latitude and longitude coordinates.
>
> 19. The system of claim 11, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as city/state.
>
> 20. The system of claim 11, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying a map that includes a mark indicating the location of the vehicle on the map.

(A111 at 24:10-27.)

The claims themselves belie the district court's characterization of them as merely abstract. Moreover, the timing of the patents' issuance is more than telling. The patent examiner issued four of the five patents-in-suit *after* applying the Patent Office's guidelines for implementing *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014). (A280-81.) The examiner did not reject a single claim under 35 U.S.C. § 101, and he determined that each claim included a novel and non-obviousness method or system for tracking freight that was different than all the cited prior art. (A459-62; A463-68; A469-74; A475-77; A478-86.)

III. <u>The Proceedings Below</u>: The District Court Misapplies *Alice* at the Rule 12(b)(6) Stage Without Addressing MacroPoint's Expert or All Claims.

MacroPoint began offering its patented solution in 2011 and quickly experienced success—its software tracks over 500,000 drivers across North America and is used by over 6,000 trucking companies and others to provide real-time supply chain visibility. *See Why Choose MacroPoint?*, http://www.macropoint.com/why-macropoint/ (last visited Mar. 2, 2016). MacroPoint filed this suit after FourKites began infringing in 2014 by selling an application that competes with MacroPoint's technology. (A141-52; A689-91.) The district court, acting without benefit of a hearing, dismissed the suit under Rule 12(b)(6) and found all claims invalid under 35 U.S.C. § 101. (A1-14.) Although the court invalidated all 94 claims of the patents-in-suit, it addressed only one—claim 1 of the '943 patent—even though MacroPoint had identified others as distinct. (A2 n.1; A295.)

Addressing the first step of the *Alice* test, the court held that "the patents-in-suit are directed to the abstract idea of tracking freight." (A6.) The court concluded that "the claim discloses nothing more than a process for tracking freight, including monitoring, locating, and communicating regarding the location of the freight," (*id.*), even though the claims in fact recite a particular way of monitoring freight—*i.e.*, by obtaining information from a third-party location information provider rather than a device in the truck or the driver. The court also did not address any of the specific claims to locating freight in a specific manner (*e.g.*, without GPS as in claims 2 and 3

of the '943 patent) or that require communicating its location in a particular way (*e.g.*, by displaying a map showing the truck's location as in claim 20 of the '098 patent).

Moving to the second *Alice* step, the court concluded that the claims included no "inventive concept" beyond the abstract idea of tracking freight. The court found that the concept of obtaining location information from computers at a third-party location provider that came from communication devices, rather than a device in the truck, was not inventive because it still involved "transmitting and receiving data," which "are basic and generic computer functions," even though the record contains no evidence that computers had been used to track or monitor location in this way before. (A10-11.) The court also stated that MacroPoint's approach to correlating the location of a communications device to the location of freight (*e.g.*, by determining which cell phone belongs to which driver and which driver is in which truck) is not an inventive concept, because "[c]orrelating simply connotes the ascertaining of a relationship between two pieces of information," and "plaintiff does not profess to have invented the ability to locate freight through the use of signals." (A10.) The court overlooked the fact that MacroPoint had solved a particular problem—*i.e.*, matching a device to a truck—that arose only because MacroPoint departed from the prior art systems in which trucks may have used installed, dedicated GPS equipment to provide location information or required a personal call from the drivers. The court concluded that the claims might encompass trucks with dedicated GPS equipment, (A10), ignoring dependent claims (*e.g.*, claims 2 and 3 of the '943 patent)

that explicitly exclude GPS, and ignoring MacroPoint's unrebutted expert testimony that such systems obtained information directly from GPS devices rather than from a third-party location information provider, as claimed. (A27 at 1:31-36; A347-48.)

The court then raised, *sua sponte*, the "machine or transformation test" and explained that this further supported its conclusion, because the patents were supposedly "not tied to any particular machine or apparatus," and instead "require only a general purpose computer." (A13.) But all the claims require computers, communication devices, cell towers, *and* other devices that are specially programmed to carry out the claimed functions and require specialized hardware to locate and monitor the device (and thus the freight).

Finally, the district court acknowledged that the claims disclosed in the patents were novel and do not preempt all ways of tracking freight but dismissed these facts as irrelevant. The court criticized MacroPoint for "offer[ing] nothing 'in addition' to the argument that these steps have not been used in the industry," (A11), even though this strongly supports their patent-eligibility. The court acknowledged that "the patents-in-suit do not entirely foreclose all tracking of freight," but thought it enough that the claims supposedly involve "well-understood, routine, conventional activity," (A13), even though no one had ever used this approach before MacroPoint.

Having concluded that claim 1 of the '943 patent was invalid, the court invalidated the system claims as well, stating without explanation that "[i]n substance, the method and system claims do not differ." (A14.) This appeal followed.

SUMMARY OF THE ARGUMENT

The claims are all patent-eligible under both steps of the *Alice* analysis. No claim is "directed to" the abstract idea of tracking freight, rather the real-time location monitoring of freight through third-party communications. A claim that covers only a specific application of an abstract idea cannot be said to be "directed to" the idea itself. *Alice* explained that its only objective is to prevent pre-emption of abstract ideas, so, when a claim leaves significant uses of the abstract idea in the public domain, it should pass the first *Alice* step. The claims here are directed to a specific manner of monitoring freight in real time—obtaining a device's location from a third party and correlating that device to a particular truck, while securing the driver's consent. This approach does not resemble pre-existing human activity, and it leaves virtually every other manner of tracking freight unpatented.

The claims satisfy the second *Alice* step for a similar reason—they cover a specific, unconventional solution to the problem of tracking freight. They require specially programmed computers and devices that interact in a way that was unknown in the prior art. No existing freight-tracking system obtained location information from a third party, rather than the device in the vehicle itself. Although the claims cleverly apply existing technology, they make continuous, real-time location information available to shippers in a consolidated way that the prior art never could.

At a minimum, this Court should remand because the district court addressed only one claim and never mentioned MacroPoint's expert testimony and argument.

<u>LEGAL STANDARDS</u>

The patent act broadly makes "any new and useful process, machine, manufacture, or composition of matter" patent eligible. 35 U.S.C. § 101. But the Supreme Court has devised a limited exception: "[l]aws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014). "[T]he concern that drives this exclusionary principle [i]s one of pre-emption." *Id.* The Court recognized that "[a]t some level, all inventions" stem from those building blocks, so "an invention is not rendered ineligible for patent simply because it involves an abstract concept." *Id.* It has thus set forth a two-step framework to distinguish patents that claim abstract ideas from those that claim patent-eligible applications of those ideas. *Id.* at 2355. The first step asks if the claims are "directed to one of those patent-ineligible concepts." If so, the second step considers whether the claims include an "'inventive concept'—*i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Id.*

Patent eligibility is a legal question reviewed *de novo*. At the pleadings stage, all facts must be considered in a light most favorable to the plaintiff. *Am. Seating Co. v. USSC Grp., Inc.*, 514 F.3d 1262, 1267 (Fed. Cir. 2008). Invalidity must be proven by clear and convincing evidence, especially where, as here, the Patent Office has considered the same issue. *Microsoft Corp v. i4i Ltd. P'ship*, 131 S. Ct. 2238 (2011).

ARGUMENT

I. The Judgment Should Be Reversed Because the Claims are Patent-Eligible Under 35 U.S.C. § 101.

A. The Claims Are Not "Directed to" the Abstract Idea of Tracking Freight, and Cover Only a Concrete Improvement to the Prior Art.

The claims here pass the first step of the *Alice* analysis because they are not "directed to" the district court-created abstract idea of tracking freight. The claims are instead directed to a narrow application that allows shippers, brokers, customers, and freight companies to monitor freight location in a more efficient, accurate, and real-time manner. The district court erroneously assumed that any claim that is related in any way, or that can be reduced in characterization, to an abstract idea as the court defined it, meets the first *Alice* step. This approach is an erroneous extension of the *Alice* standard. The Supreme Court has acknowledged that "[a]t some level, all inventions" stem from abstract ideas, natural phenomena, or laws of nature. *Alice*, 134 S. Ct. at 2354. When courts analyze whether a claim is "directed to" an abstract idea, they necessarily must require a close congruency between the abstract idea and what is claimed—otherwise every claim of every patent would fail this *Alice* step so long as the court could articulate an abstract-sounding description of the claims, rendering this part of the test superfluous. The key indicator should be pre-emption: if, at first glance, the claim appears to pre-empt the abstract idea, then it is "directed to" that idea. The claims here, by contrast, do not pre-empt every way of tracking freight, and so are not "directed to" that idea.

Precedent dealing with the first *Alice* step—*i.e.*, whether a claim is "directed to" an abstract idea—can be grouped into two distinct lines of cases, both presenting preemption issues. One of those lines has held that implementing an abstract human behavior on a computer that mimics what humans always did is not patent-eligible. *See, e.g.*, *Alice*, 134 S. Ct. at 2355-57 (invalidating claims to computers that use an intermediary to facilitate settlement); *Bilski v. Kappos*, 561 U.S. 593 (2010) (invalidating claims to hedging against financial risk of price fluctuations); *Mortgage Grader, Inc. v. First Choice Loan Servs., Inc.*, __ F.3d __, 2016 WL 362415, at *7 (Fed. Cir. Jan. 20, 2016) (invalidating claims to "anonymous loan shopping" where the steps "could all be performed by humans without a computer"); *Intellectual Ventures I LLC v. Capital One Bank*, 792 F.3d 1363, 1367 (Fed. Cir. 2015) (invalidating claims to "tracking financial transactions to determine whether they exceed a pre-set spending limit (i.e., budgeting)" and "[t]ailoring information based on the time of day of viewing" where humans had done both for decades before computers); *Versata Development Gp. v. SAP Am., Inc.*, 793 F.3d 1306, 1333-34 (Fed. Cir. 2015) (invalidating claims to "determining a price" based on characteristics of the product and customer); *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014) (invalidating claims directed to "the abstract idea of showing an advertisement before delivering free content"); *Content Extraction v. Wells Fargo Bank*, 776 F.3d 1343, 1347 (Fed. Cir. 2014) (invalidating claims to digitally extracting information from checks where bank tellers had previous done it manually); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1364-65 (Fed. Cir. 2014)

(invalidating claims that were "squarely about creating a contractual relationship—a 'transaction performance guaranty'—that is beyond question of ancient lineage"); *cf., CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011) ("[A] method that can be performed by human thought alone is merely an abstract idea and is not patent-eligible under § 101.").

Many of these patents involved "business methods," where allowing a patent on a generic business practice by use of an algorithm (*e.g.*, hedging, budgeting, selecting prices) could widely preempt basic ways of transacting business that are common across multiple fields. Adding computers as computational devices simply does not alleviate the pre-emption problem because, as a practical matter, everyone uses computers (such as spreadsheet programs or computational calculators) to accomplish those tasks. The MacroPoint invention does not suffer from this infirmity.

The second line of cases involves broad and generic claims that cover every conceivable application of the abstract idea and therefore preempted it. *See Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1348 (Fed. Cir. 2015) (invalidating claims covering every way of "retaining information in the navigation of online forms," where the "mechanism for maintaining the state is not described, although this is stated to be the essential innovation," and, as a result, "the claim is directed to the idea itself—the abstract idea of avoiding loss of data"); *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1349-51 (Fed. Cir. 2014) (invalidating claims to a

general process for combining two data sets into a "device profile," because they were "so abstract and sweeping as to cover any and all uses of a device profile," and invalidating claims to the device profile itself where they "encompass all embodiments of the information contained in the device profile, regardless of the process through which this information is obtained or the physical medium in which it is stored").

Neither situation is present here. MacroPoint's patents do not merely implement pre-existing human activity on a computer. It is impossible for truckers themselves to continuously report their location or for a shipper to track them all in real time, much less to do so in a way that enables shippers to access the information in real time across multiple trucking companies. Prior systems all obtained the information either sporadically from the driver or from a device installed in the truck. The dependent claims underscore that the invention involves activity humans cannot perform: some are limited to real-time monitoring of location using GPS, while others are limited to monitoring of location using the non-GPS techniques described in the specification, such as advance forward link trilateration (AFLT), observed time difference (OTD), or Cell-ID (CID). (*See, e.g.*, A37 at 21:39-51, 22:55-67; A30 at 7:1-8:13; A360-63; A384-86.) Still other claims involve reporting location based on latitude and longitude or as a graphical depiction on a map. (*See, e.g.*, A111 at 24:10-15.) None of those tracking techniques could be accomplished by humans alone, which strongly suggests they are patent-eligible under § 101. *See, e.g*, *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1331-33 (Fed. Cir. 2010) (upholding patent-

eligibility of claims to a "method for calculating the absolute position of a GPS receiver," because the GPS receiver was a specific machine integral to all the claims and "there is no evidence here that the calculations here can be performed entirely in the human mind"). MacroPoint's claims certainly are not a business method like most of the prior cases—they creatively apply technology to solve a problem in a new way, rather than taking an age-old solution (like budgeting) and putting it on a computer. They do not simply implement human behavior on a computer that mimics what humans used to do themselves.

MacroPoint's claims also do not cover every way of tracking freight, as even the district court acknowledged. (A13.) They do not rely on individuals reporting their location manually. They do not cover systems that use pagers or dedicated GPS-equipment installed in a truck, where the freight company obtains location information directly from the device. And they do not cover obtaining location information directly from a driver's cell phone. The claims instead are limited to a specific solution to the problem of tracking freight in real time in which the system obtains location information from a source other than the trucker's device (*i.e.*, from a third party like AT&T Wireless, Verizon, or Google), and then must correlate that device to a particular truck or shipment, all while securing the driver's consent. (A36-37 at 20:63-21:38.) The claims describe a specific sequence of transmissions between specific parties and devices to accomplish these results, which differs from many other methods of tracking freight. (*Id.*; A336-39.) Dependent claims further restrict

how the device's location is monitored (*e.g.*, GPS or non-GPS techniques) and restrict how the location information is displayed to interested parties (*e.g.*, by latitude and longitude or graphically on a map). MacroPoint's patents thus disclose and claim a specific way of monitoring freight, unlike in *Internet Patents*, and do not broadly pre-empt every way of doing so, unlike *Internet Patents* and *Digitech*. The upshot is that there are still plenty of ways to track vehicle location without infringing the patents-in-suit.

MacroPoint's claims thus all pass the first *Alice* step, because they are drawn to a narrow application or solution to the problem of monitoring freight in real time, rather than being "directed to" any means of tracking freight in the abstract. The Supreme Court created this judicial exception to the broad text of § 101 only to avoid pre-emption of the basic building blocks of knowledge. *Alice*, 134 S.Ct. at 2354 ("We have described the concern that drives this exclusionary principle as one of pre-emption"). This Court has remarked that *Alice*'s two-step inquiry is supposed to address pre-emption concerns. *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015) ("[Q]uestions on preemption are inherent in and resolved by the § 101 analysis."). Courts must therefore apply the first *Alice* step consistently with the purpose of the inquiry. Where, as here, many uses of the abstract idea are not pre-empted by the claims, then the claims are not actually "directed to" the abstract idea itself.

Fundamentally, the district court's analysis went awry because it simply described the claims at a very high level of generality (*e.g.*, tracking freight), and then held the claim is "directed to" that concept because it necessarily relates to accomplishing that general goal. Using this approach, virtually every patent claim will fall: a patent to Edison's light bulb could be said to be "directed to" the natural phenomenon of using electricity to create light. Precedent does not read *Alice* to permit such a sweeping rule of invalidation. Rather, it is intended simply to distinguish unpatentable claims that truly cover the abstract idea itself, *e.g.*, *Gottschalk v. Benson*, 409 U.S. 63 (1972), from patent-eligible claims to an application of an abstract idea. *See, e.g.*, *Diamond v. Diehr*, 450 U.S. 175 (1981). If, as here, the claims propose a unique and detailed solution to the general problem, they simply are not "directed to" every way of solving the problem or every implementation of the abstract idea. They are instead the very type of application of the idea that is supposed to be patent-eligible.

To hold otherwise would be to put every computer-implemented claim (and maybe nearly *every* patent claim) at serious risk. All claims, at some level, involve natural phenomena, laws of nature, or abstract ideas. If all a court must do under the first *Alice* step is to generically describe a claim as relating to one of those three principles, then every claim will fail the first *Alice* step. Such an approach would render this step superfluous. Where the Supreme Court sets out a two-part test, this approach necessarily is error. The district court erred by applying *Alice* in this

overbroad manner, rather than recognizing that the claims here are drawn to a specific solution to the problem of tracking freight, and its judgment should be reversed on that basis alone.

B. Obtaining Location Information from a Third Party While Correlating a Device to Particular Freight is an Inventive Concept.

Even accepting the district court's erroneous conclusion that the claims are "directed to" the idea of "tracking freight," they are nevertheless patent-eligible under the second *Alice* step. The claims include an additional inventive concept—obtaining a device's location from a third party's servers (rather than from the device itself)—and correlating that device with a particular shipment, all while obtaining the driver's consent (which had been unnecessary in the prior art). MacroPoint's expert contrasted this patented invention with "conventional" systems that obtained data from a pre-installed GPS receiver in the truck, and thus did not face the problems of correlating a device with a truck or of obtaining the trucker's consent. (A336-77.)

The patented invention was thus a technological solution to technological problems that had been created by prior art technology. (A373-77.) Having each trucking fleet use its own pre-installed equipment, or having none at all with independent drivers, made it impossible for shippers to simultaneously track their packages across multiple fleets in real-time. (A27 at 1:37-43; A348-49.) The patents solved this problem by using a fundamentally different arrangement of computer hardware, devices, and cell towers (*e.g.*, obtaining location information from third

parties like AT&T, Verizon, or Google, who were absent from the prior art), and fundamentally different software (*e.g.*, with logic to link a device to a truck and to promptly obtain the necessary consent). (A386-96.) That amounts to something "significantly more" than the abstract idea of tracking freight and passes the second *Alice* step.

MacroPoint's technological solution is similar to the one approved in *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014). There, the court upheld claims directed to a method that helped retailers retain web customers by allowing them to provide links to third-party products that took the customer to a webpage that maintained the same "look and feel" as the retailer's site. *Id.* at 1257-58. The invention fixed a problem with prior systems, where a retailer who linked directly to another merchant's site would risk losing customers without ever having them return. *Id.* The invention was thus patent-eligible because "the claims at issue [t]here specif[ied] how interactions with the Internet are manipulated to yield a desired result—a result that overrides the routine and conventional sequence of events ordinarily triggered by the click of a hyperlink." *Id.* at 1258. When the claim elements were "taken together as an ordered combination, the claims recite an invention that is not merely the routine or conventional use of the Internet." *Id.* at 1259. Significantly, "the claims at issue d[id] not attempt to preempt every application of the idea of increasing sales by making two web pages look the same." *Id.*

MacroPoint's invention is patent-eligible for similar reasons. The claimed invention enables shippers to continuously monitor freight across multiple trucking lines in real time, getting the information from a single source. The invention solves a problem with the prior art, where shippers had to check with each trucking company or driver individually, because prior systems obtained the data from GPS receivers in the trucks or the driver himself, rather than from third parties with data across all trucking lines. The invention solves that problem by specifying a particular set of interactions between various pieces of technological hardware: where the requesting party seeks the information from a third-party location provider like AT&T, Verizon, or Google (rather than from the GPS device itself) the system correlates a device with a truck, and then secures the trucker's consent to provide his location. These interactions differ starkly from prior art systems, which all obtain location information from the device in the truck (or directly from the trucker by sporadic calls). The result is that the claims, when taken as an "ordered combination," reflect an invention that is "significantly more" than a generic way of tracking freight, and an invention that doesn't preempt all ways of tracking freight.

The district court erroneously concluded otherwise by dismissing the claims as drawn to "transmitting and receiving data," which "are basic and generic computer functions." (A11.) This overlooks the crux of the invention—transmitting and receiving location data *from a third party*, not from a device installed in the truck. Not even FourKites considered this approach conventional, and MacroPoint's expert said

without contradiction that it was not. (A395.) The district court's error is particularly apparent in light of *DDR*: the *DDR* patents involved sending and receiving data over the Internet, yet they were patent-eligible because the data was being routed in an unconventional way (through an "outsource provider" that assembled a composite webpage). The same is true here where the MacroPoint system requests data from a third-party location provider rather than the device itself or the driver. In both situations, the proper analysis is to look at the claims as a whole, rather than particular elements. Viewed appropriately in that light, the MacroPoint claims are not conventional, and, indeed, do not cover the old ways of tracking freight.

The district court's approach, if taken to its logical conclusion, would invalidate virtually every software claim. All such claims necessarily involve "conventional" computer activities like processing, sending, receiving, and correlating information. But resting the analysis on a high-level re-characterization of the claims is the wrong inquiry. If the invention is performing those functions in a unique and previously unknown manner, then there is no reason why such claims should not be patent-eligible. In fact, we know they are patent-eligible—*DDR* holds that using existing Internet architecture in a new way passes muster under *Alice*. The invention here is likewise patent-eligible: it harnessed location data about cellphones by astutely collecting it from third-party location information providers (like AT&T, Verizon, and Google) and seamlessly presenting it to shippers and customers in real time.

This is not a situation in which a patentee has taken conventional, long-existing human activity and merely implemented it on a general purpose computer. For one thing, the claims all require computers, communication devices, and cell towers that are specifically programmed to perform in a way that was unknown in the prior art and is not analogous to how humans manually track freight. If the combination of hardware and programming here is erroneously dismissed as insufficient to confer patent-eligibility, then it is difficult to imagine what limiting principle could prevent this from wiping out all software patents. For another thing, many of the MacroPoint dependent claims require use of specific machines (*e.g.*, a GPS receiver, or a non-GPS receiver that can communicate its location by AFLT, OTD, or CID techniques). *See SiRF*, 601 F.3d at 1332-33 ("We also think that the presence of the GPS receiver in the claims places a meaningful limit on the scope of the claims."); *see, e.g.*, A111 at 23:4-13 (dependent claims 13 and 14). These specially programmed computers and devices also show that the claims meet the machine-or-transformation test, underscoring their patentability.

The bottom line is that the claimed invention applies computer technology to monitor the location of freight in real time in a limited way that differs from any other prior art system, such that even the district court acknowledged that they "do not entirely foreclose all tracking of freight." (A13.) The claims' creative approach of monitoring freight location by obtaining the information from a third party while simultaneously correlating each device to a truck and obtaining the necessary consent

is thus an "inventive concept" that satisfies the second *Alice* step, and the district court's invalidity judgment should be reversed.

II. At a Minimum, this Court Should Remand for a Claim-by-Claim Analysis in Light of MacroPoint's Argument and Expert Testimony.

The discussion above demonstrates that the district court's judgment can be reversed outright, because the claims all pass both steps of the *Alice* analysis. If there is any doubt, however, the case should at least be remanded to the district court based on two procedural errors.

First, the district court erroneously based its entire analysis on only a single claim—claim 1 of the '943 patent—yet its judgment invalidated every claim of the five patents-in-suit. The court justified this step by observing that "[c]laim 1 in the '943 patent is representative of the claims of the patents-in-suit," but it never performed any analysis to compare the various claims. (A2.) Instead, the court thought it sufficient that MacroPoint supposedly did "not dispute that Claim 1 is representative," when, in fact, MacroPoint had identified specifically dependent claims 2 and 3 of the '943 patent as being different, because they limit the method to obtaining location information without using GPS. (A295 (opposition brief identifying claims 2 and 3); A37 at 21:39-51 (relevant claim language).) Moreover, the district court acknowledged that MacroPoint had argued that FourKite's analysis of a single claim was inadequate without a showing of representativeness. (A2 n.1.) Indeed, other claims limited the invention to narrower applications, such as

dependent claims 18-20 of the '098 patent, which require displaying the truck's location in specific ways. (A111 at 24:10-27.) The district court thus should have considered those dependent claims separately, as they are presumed valid and are independently patent-eligible. *See* 35 U.S.C. § 282. The district court compounded its error by giving short shrift to all the system claims, dismissing them in a single sentence. (A14.) The system claims all cover unique combinations of machines that are specially programmed to interact in a way dissimilar from any prior art, and again, are all independently patent-eligible.

Second, the district court did not correctly apply the proposition that FourKites bears the burden of establishing invalidity by clear and convincing evidence and never acknowledged that all disputed facts are to be resolved in MacroPoint's favor at the pleadings stage, and never acknowledged that MacroPoint submitted expert testimony in support of its position.

The court's mistakes here significantly prejudiced MacroPoint. The experts' thorough declarations contrasted old "conventional" freight tracking systems with the claimed invention, showed that the claims were meaningfully limited in ways that prevented them from preempting all freight tracking, and showed that the Patent Office had considered all these points in allowing many of the claims. (A342-A422; A459-62; A463-68; A469-74; A475-77; A478-86.) Yet the court never addressed the declarations and, given that the court decided the motion without a hearing, it is impossible to know whether the court carefully considered their import.

Therefore, at a minimum this Court should vacate the judgment and remand for the district court to consider all the asserted claims in light of the separate presumption of validity for each and in light of MacroPoint's expert testimony.

CONCLUSION

For the reasons above, the Court should reverse or vacate the invalidity judgment.

Dated: March 3, 2016

Respectfully submitted,

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ADDENDUM

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

MacroPoint, LLC,	)	**CASE NO. 1:15 CV 1002**
	)	
Plaintiff,	)	**JUDGE PATRICIA A. GAUGHAN**
	)	
Vs.	)	
	)	
FourKites, Inc.,	)	**Memorandum of Opinion and Order**
	)	
Defendant.	)	

INTRODUCTION

This matter is before the Court upon Defendant FourKites, Inc.'s Motion to Dismiss First Amended Complaint for Failure to State a Claim Upon Which Relief Can Be Granted as a Matter of Law (Doc. 18). This is a patent infringement action. For the reasons that follow, the motion is GRANTED.

FACTS

Five patents are at issue in this lawsuit. The patents are directed at "a system for providing location information of a vehicle [that] includes a communications interface and a

correlation logic that correlates location information of a communications device to location of the vehicle." Claim 1 in the '943 patent is representative of the claims of the patents-in-suit and provides as follows:[1]

> A computer implemented method for indicating location of freight carried by a vehicle, the method comprising:
>
> [a] correlating the freight to a communications device;
>
> [b] receiving a first signal including data representing a request for information regarding the location of the freight;
>
> [c] transmitting to the communications device a second signal including data that prompts an automated message to be communicated to a user of the communications device, the automated message representing a notice communicating to the user of the communications device that the location information of the communication device will be obtained;
>
> [d] receiving from the communications device a third signal including data indicative of consent from the user to the obtaining of the location information of the communications device;
>
> [e] transmitting a fourth signal to a location information provider, the fourth signal including data representing a request for location information of the communications device, wherein the location information provider corresponds to a party or device other than the communications device and the location information provider corresponds to at least one of:
>
> > [e][i] a wireless service provider providing wireless service to the communications device,

[1] Plaintiff does not dispute that Claim 1 is representative of the claims of the patents-in-suit. Plaintiff instead argues that defendant fails to address all of the 94 claims across all five patents-in-suit. Plaintiff is incorrect. If one claim is a representative claim, courts need not address each claim individually. *See*, *Content Extraction and Transmission, LLC v. Wells Fargo National Bank Association*, 776 F.3d 1343, 1348 (Fed. Cir. 2014); *In re TLI Communications*, 2015 WL 627858 at * 9 (Feb. 6, 2015).

> [e][ii] a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and
>
> [e][iii] a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider;

[f] receiving a fifth signal from the location information provider, the fifth signal including data representing the location information of the communications device;

[g] correlating the location information of the communications device to the location of the freight based at least in part on the correlation between the freight and the communications device; and

[h] transmitting a sixth electronic signal including data representing the location of the freight.

The ‘943 patent issued on December 10, 2013. The remaining patents issued more than a year after the Supreme Court decided *Alice Corp. Pty. Ltd. v. CLS Bank International*, 134 S.Ct. 2347 (2014). Defendant moves to dismiss the case on the grounds that the patents-in-suit are invalid in light of *Alice*. Plaintiff opposes the motion.

ANALYSIS

1. Propriety of a motion to dismiss

As an initial matter, the Court finds that it is procedurally proper to address defendant’s arguments concerning invalidity based on patent-eligibility at the 12(b)(6) stage. *See*, *Content Extraction and Transmission, LLC v. Wells Fargo National Bank Association*, 776 F.3d 1343 (Fed. Cir. 2014). This is especially so in light of the fact that plaintiff does not argue that claim construction is necessary for a resolution of the instant dispute. In addressing defendant’s arguments, the Court will presume that the patents are valid and grant the motion only if defendant is able to show invalidity by clear and convincing evidence. Although post-*Alice*

courts appear to call into question whether a presumption of validity applies in this context, the Court will apply the presumption especially in light of the fact that the PTO issued four of the five patents-in-suit after the Supreme Court decided *Alice*. The Court will not, however, consider the expert affidavit offered by plaintiff as evidentiary matters outside of the complaint are not to be considered by a Court in addressing a motion under Rule 12. With these standards in mind, the Court turns to defendant's invalidity argument.[2]

2. *Alice*

Defendant asks that the Court declare the patents at issue invalid because they are drawn to an abstract idea. Pursuant to 35 U.S.C. § 101, "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore...." Section 101 is limited, however, and does not cover "laws of nature, natural phenomena, and abstract ideas." *Alice*, 134 S.Ct. at 2354. In "applying the § 101 exception, we must distinguish between patents that claim the 'building block[s]' of human ingenuity and those that integrate the building blocks into something more." *Id*. (*Citing Mayo Collaborative Services, v. Prometheus Laboratories, Inc.*, 132 S.Ct. 1289, 1303 (2012)).

In *Alice*, the Supreme Court employed a two-part test "for distinguishing patents that

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[2] Plaintiff relies heavily on the Court's decision in *Progressive Cas. Ins. Co. v. Safeco Ins. Co.*, in which this Court determined that invalidity should be addressed after claim construction. As an initial matter, the plaintiff in *Progressive* argued that claim construction was necessary for a resolution of the matter. Moreover, the Court decided that issue long before the wave of invalidity arguments made after recent Supreme Court and Federal Circuit decisions. Invalidity arguments based on patent-eligibility are now routinely addressed at the 12(b)(6) stage.

claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Id*. at 2355. First, the court must determine "whether the claims at issue are directed at a patent-ineligible concept." If the claims are so construed, the Courts must proceed to step two, which involves a determination as to whether the patent contains an "inventive concept," which is described as "an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself." *Id*. (Internal citations and quotations omitted).

A. Patent-ineligible concept

Generally speaking, this prong addresses whether the patent is directed to an "abstract" idea because there is a longstanding rule that "an idea itself is not patentable." *Id*. (Citations and quotations omitted). For this reason, patents describing algorithms and other mathematical formulas are invalid. In addition, patents involving general conceptual ideas are not patentable. *See, e.g., Alice,* 134 S.Ct. 2347 (patent directed at abstract idea of "intermediated settlement") *Bilski v. Kappos*, 561 U.S. 593 (2010)(patent involved abstract idea of hedging); *Ultramerical, Inc. v. Hulu*, LLC, 772 F.3d 709 (Fed. Cir. 2014)(patent directed at the "use of an advertisement as a currency exchange" constituted abstract idea); *Wireless Media Innovations, LLC v. Maher Terminals*, LLC, 2015 WL 1810378 (D.N.J. April 20, 2015)(the "monitoring locations, movement, and load status of shipping containers within a container-receiving yard, and storing, reporting, and communicating this information" constitutes an "abstract idea.").

Here, defendant claims that the patents involve the abstract idea of tracking freight. According to defendant, the patents involve basic concepts like "(1) receiving a request for the location of the freight; (2) asking the truck in possession of that freight where it is; and (3)

reporting the location of the truck." Defendant argues that the claims simply "use" a computer to accomplish these tasks. Because the claims constitute nothing more than a "method of organizing prior-existing, basic human activity," they are directed at an abstract idea.

In response, plaintiff argues that defendant does not accurately describe the patent. According to plaintiff, the patent does not "ask the truck" for its location. Rather, the freight is located through an indirect communication with a communication provider. Plaintiff argues that the patent is not directed to the general idea of tracking freight, but rather a specific way of tracking freight.

Upon review, the Court finds that the patents-in-suit are directed to the abstract idea of tracking freight. "Under step one of *Mayo/Alice*, the claims are considered in their entirety to ascertain whether their character as a whole is directed to excluded subject matter." *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015). In determining whether an idea is abstract, courts are to ask "what the claim is trying to achieve, instead of examining the point of novelty." *Enfish LLC v. Microsoft Corp.*, 56 F.Supp.3d 1167 (C.D. Cal. Nov. 3, 2014)(*citing Diamond v. Diehr*, 450 U.S. 175 (1981)). As such, "[c]ourts should recite a claim's purpose at a reasonably high level of generality. Step one is sort of a 'quick look' test, the purpose of which is to identify a risk of preemption and ineligibility." *Id*. Here, the claim discloses nothing more than a process for tracking freight, including monitoring, locating, and communicating regarding the location of the freight. These ideas are all abstract in and of themselves. *See, Wireless Media Innovations, LLC v. Maher Terminals*, LLC, —F.Supp.3d— , 2015 WL 1810378 (D. N.J. April 20, 2015)(process for tracking freight is an abstract idea).

Plaintiff argues that *Wireless Media* is distinguishable. According to plaintiff, the PTO

issued the patents in *Wireless Media* before the Supreme Court's decision in *Alice*. Contrary to plaintiff's argument, the fact that the PTO may have considered *Alice*-based guidelines before issuing the patents-in-suit does not *mandate* a finding that the patents are valid. Nor does the fact that *Wireless Media* involved a "local, closed, single-channel, discrete environment" as opposed to a "open system for multi-channel, real-time tracking of vehicles and freight nationwide" render the subject matter of the patents-in-suit something other than an abstract idea. Although plaintiff notes the difference, plaintiff fails to offer any explanation as to why this fact is relevant to this issue.

Plaintiff relies on *DDR Holdings, LLC v. Hotels.com L.P.*, 773 F.3d 1245 (Fed. Cir. 2014) in support of its position that the subject matter is not directed to an abstract idea. In *DDR Holdings*, the court examined a patent comprising "systems and methods of generating a composite web page that combines certain visual elements of a 'host' website with the content of a third-party merchant." *Id*. at 1248. In layman's terms, it appears that the patent allowed an internet retailer to publish content from a third-party retailer in order to avoid the situation in which a user clicks on an advertisement and is redirected away from the original retailer's site. The Federal Circuit concluded that the patent passed muster under Section 101 because it was "necessarily rooted in computer technology to overcome a problem specifically arising in the realm of computer networks." *Id*. at 1257. Although the court began its analysis by noting that the subject matter at issue involved a "challenge particular to the internet" that impliedly is not abstract, the court ultimately determined that "under any characterization of the abstract idea, the [ ] patent's claims satisfy *Mayo/Alice* step two." *Id*. Thus, the Court does not find that *DDR Holdings* controls with regard to step one of *Alice*.

Plaintiff also cites *Messaging Gateway Solutions, LLC v. Amdocs, Inc.*, 2015 WL 1744343 (D. Del. April 15, 2015). That case, however, actually supports defendant's position. Although ultimately the court determined that the patent contains an inventive concept at step two, the court found that a patent encompassing a "method of using a computer system to facilitate two-way communication between a mobile device and an Internet server" is directed at an abstract idea for purposes of step one. *See also, Content Extraction and Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343 (Fed. Cir. 2014)(method patent directed at the extraction of data from hard copy documents, recognition of specific data, and storage of the data is directed at abstract idea); *Cyberfone Systems, LLC v. CNN Interactive Group, Inc.*, 558 Fed. Appx. 988 (Fed. Cir. 2014)(method patent whose steps require obtaining data, "exploding" data into parts, and sending data to different destinations directed at abstract concept); *MicroStrategy, Inc. v. Apttus Corp.*, 2015 WL 4425828, —F.Supp.3d— (E.D. Va. July 17, 2015)(patents for intelligent server system, method and system for providing business intelligence web content, and system and method for remote manipulation for analytic reports all directed to abstract ideas); *Market Track, LLC v. Efficient Collaborative Retail Marketing, LLC*, 2015 WL 3637740 (N.D. Ill. June 12, 2015)(method patent directed at creating output files from images did not satisfy part one of the *Alice* test).

In sum, the Court finds that the patent is directed at a method for tracking freight, which is an abstract concept. Having so concluded, the Court now turns to step two of the *Alice* test.

B. Inventive concept

At step two, this Court must determine whether the elements of the claim contain an "inventive concept sufficient to transform the claimed abstract idea into a patent-eligible

application." In other words, the Court must determine whether the claim includes "additional features" such that the claim is "more than a drafting effort designed to monopolize the abstract idea." *Alice*, 134 S.Ct. at 2357 (citations and quotations omitted). The "additional features" must be more than 'well-understood, routine, conventional activity.'" *Ultramerical, Inc. v. Hulu, Inc.*, 772 F.3d 709, 715 (Fed. Cir. 2014)(*quoting Mayo Collaborative Services v. Prometheus Labs., Inc.*, 132 S.Ct. 1289, 1298 (2012)). Adding the words "apply it" or the mere introduction of a computer used to implement the abstract idea is insufficient to satisfy *Alice*'s second prong.

Plaintiff points to three "inventive concepts" that it claims are present in the patents-in-suit. According to plaintiff, the patents include the inventive concept of "correlating the location information of a communications device with the location of freight or a vehicle." Plaintiff claims that this provides a technical solution to a technical problem, namely "how to monitor the location of freight or vehicle by technical means other than a dedicated GPS receiver installed in the vehicle." According to plaintiff, this is a technical solution because it allows the tracking of freight without the use of a dedicated GPS receiver and instead discerns the location through a location information provider and correlates the device's location to that of the freight or vehicle.

In addition, the plaintiff argues that patents are inventive because they obtain location information through an intermediary and not directly from the communication device itself. Plaintiff argues that this second inventive concept further reduces reliance on GPS-based information in order to determine freight location.

According to plaintiff, the patents-in-suit contain a third inventive concept. Plaintiff points out that claim 1 of the '943 patent provides a "signal including data that prompts an

automated message to be communicated to a use of the communications device" and a "signal including data indicative of consent from the user" regarding the location of the device. According to plaintiff, this solves the technical problem of obtaining consent for location information from the owner of the device. Plaintiff claims that use of a manul or automatic system to call each user individually in order to obtain consent would be prohibitively inconvenient. Plaintiff claims that this is an inventive concept that is "tethered to the technology that created the problem" and is therefore akin to *DDR Holdings*.

As an initial matter, the Court agrees with defendant that plaintiff's first proposed inventive concept amounts to the correlation of information. "[C]orrelating" information, however, does not add an inventive concept. Correlating simply connotes the ascertaining of a relationship between two pieces of information. Here, plaintiff does not profess to have invented the ability to locate freight through the use of signals. Rather, the patents-in-suit simply instruct that a computer use preexisting technology to implement the correlation. This type of use of data, however, involves only the conventional use of a computer. Further, the Court agrees with defendant that plaintiff's proposed technological improvement is lacking in the claim language itself. According to plaintiff, the patents-in-suit solve the technical problem of obtaining location information by means other than use of a dedicated GPS receiver and further allows for an "open" as opposed to a "closed" system. But, as defendant points out, plaintiff fails to point to language in the claims demonstrating that its patents would not apply to a closed system. And, again, plaintiff is not claiming that it invented these other methods of tracking freight.

The same holds true for plaintiff's second and third proposed inventive concepts, *i.e.*, obtaining location information through an intermediary and obtaining consent. Plaintiff argues

that these concepts further reduce reliance on GPS-based information in order to determine freight location and solve the "unique" problem of obtaining consent. The claim language, however, accomplishes these tasks through the ordinary use of a computer that "transmits" and "receives" data from a communication device and the "location information provider." Again, transmitting and receiving data are basic and generic computer functions and these claims do not solve any problem "tethered to the technology that created the problem." *See*, *DDR Holdings, LLC v. Hotels.com L.P.*, 773 F.3d 1245 (Fed. Cir. 2014). In fact, as defendant notes, the patents-in-suit incorporate pre-existing industry standards for notice and consent in relation to the use of tracking systems. As such, the obtaining of consent was already known in the industry before the issuance of the patents-in-suit. The patents simply use a computer to "transmit" and "receive" data in order to accomplish this task. These limitations –either individually or as an ordered combination– do not transform the abstract idea into a patent-eligible application.

The overall gist of plaintiff's argument is that the concept of using a third-party intermediary to locate freight and obtain consent is an inventive concept because this method has not been used in the freight tracking industry. But, "[e]ven if some steps in the claims 'were not previously employed in this art is not enough–standing alone–to confer patent eligibility upon the claims at issue.'" *Essocite, Inc. V. Clickbooth.com, LLC*, 2015 WL 1428919 (C.D. Cal. Feb. 11, 2015)(*quoting Ultramerical*, 772 F.3d at 716)). Here, plaintiff offers nothing "in addition" to the argument that these steps have not been used in the industry. This is insufficient to confer patent eligibility.

Plaintiff's reliance on *DDR Holdings* is further misplaced. As set forth above, the patent in *DDR Holdings* was patent eligible because it contained solution "necessarily rooted in

computer technology in order to overcome a problem specifically arising in the realm of computer networks." Plaintiff attempts to compare its patent to *DDR Holdings* on the basis that requiring consent to determine location is a "new" problem that is specific to the technology of advanced communication devices. This Court disagrees. As an initial matter, asking an individual permission to ascertain location is not a solution to a technological problem. Rather, long before privacy concerns arose with the use of GPS and other types of cellular locators, humans were able to inquire as to another individual's location through the use of a telephone. The caller could ask for a location and the respondent could either provide or decline to provide his location. Plaintiff's patent simply uses a computer to perform this function. As such, the Court finds that using a computer to ask for permission before using a locating device does not solve a technological problem. Nor does the problem identified by plaintiff "specifically aris[e] in the realm of computer networks." Thus, the Court disagrees that the patent at issue in *DDR Holdings* is similar to the patents-in-suit.

Plaintiff also relies on *Messaging Gateway*, 2015 WL 1744343, in support of its position that the patents-in-suit are valid. The patent in *Messaging Gateway* was directed at a method of using a computer system to facilitate two-way communication between a mobile device and an Internet server." The court found the patent analogous to *DDR Holdings*. Specifically, the court found that the patent describes an interaction between a mobile phone system and a computer, which overrides conventional practice. The court noted that "conventional" phones could not send SMS text messages to computers. Therefore, the court reasoned, the patent contained an inventive concept because it was "tethered to the technology that created the problem." The Court finds that *Messaging Gateway* is inapposite because, as set forth above, plaintiff does not

establish that the patent's purported inventive concepts solve a problem rooted in the technology that created the problem.

Although not raised by the parties, the Court finds further support for its conclusion in the fact that the claims do not survive the "machine or transformation test." The "machine or transformation" test looks to whether a process is (1) "tied to a particular machine or apparatus or (2) transforms a particular article into a different state or thing." *Ultramerical*, 772 F.3d at 716. Although not dispositive, the "machine or transformation" test is nonetheless a "useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under § 101." *Bilski v. Kappos*, 561 U.S. 593, 604 (2010). *See also, Mayo*, 132 S.Ct. at 1303. Here, the patents are not tied to any particular machine or apparatus. Rather, they require only a general purpose computer. The patents also fail the second prong of the "machine or transformation test" because implementation of the method or system results in no transformation.

Plaintiff also argues that its patents do not preempt the field of "tracking freight" and thus the concerns of the *Mayo* court do not apply. Again, this Court disagrees. Although the patents-in-suit do not entirely foreclose all tracking of freight, the steps in the claimed invention do involve "well-understood, routine, conventional activity." *Mayo*, 132 S.Ct. at 1294. Thus, "upholding the patents would risk disproportionately tying up the use of the underlying" conventional steps. *Id*. Accordingly, plaintiffs' argument is not well-taken.[3]

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[3] Plaintiff repeatedly argues that the Reasons for Allowance issued with respect to the patents-in-suit note that the patent is distinguishable from prior art. Therefore, plaintiff claims that the patents are directed at patent-eligible subject matter. The Court disagrees. Nothing in the Reasons for Allowance dictate a finding that these concepts are inventive on the issue of patent-eligible

C. System claims

Having concluded that the method claims are invalid under Section 101, the Court finds that, for the same reasons, the system claims are invalid. In substance, the method and system claims do not differ. *See, Alice Corp.*, 134 S.Ct. at 2360.

CONCLUSION

For the foregoing reasons, Defendant FourKites, Inc.'s Motion to Dismiss First Amended Complaint for Failure to State a Claim Upon Which Relief Can Be Granted as a Matter of Law (Doc. 18) is GRANTED.

IT IS SO ORDERED.

/s/ Patricia A. Gaughan
PATRICIA A. GAUGHAN
United States District Judge

Dated: 11/6/15

subject matter. Nor is the guidance put forth by the PTO conclusive on the issue of patent-eligible subject matter. Regardless, other than a blanket statement that the Examiner presumably applied the guidance, plaintiff offers no analysis on the issue.

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

MacroPoint, LLC,	)	**CASE NO. 1:15 CV 1002**
	)	
Plaintiff,	)	**JUDGE PATRICIA A. GAUGHAN**
	)	
Vs.	)	
	)	
FourKites, Inc.,	)	**Order of Dismissal**
	)	
Defendant.	)	

This Court, having GRANTED Defendant FourKites, Inc.'s Motion to Dismiss First Amended Complaint for Failure to State a Claim Upon Which Relief Can Be Granted as a Matter of Law (Doc. 18), hereby DISMISSES this action.

IT IS SO ORDERED.

/s/ Patricia A. Gaughan
PATRICIA A. GAUGHAN
United States District Judge

Dated: 11/6/15

US008604943B2

(12) **United States Patent**
Adelson

(10) **Patent No.: US 8,604,943 B2**
(45) **Date of Patent: *Dec. 10, 2013**

(54) **SYSTEMS AND METHODS FOR MONITORING LOCATION OF FREIGHT CARRIED BY A VEHICLE**

(75) Inventor: **Bennett H. Adelson**, Beachwood, OH (US)

(73) Assignee: **MacroPoint, LLC**, Cleveland, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/613,321**

(22) Filed: **Sep. 13, 2012**

(65) **Prior Publication Data**

US 2013/0249713 A1 Sep. 26, 2013

Related U.S. Application Data

(63) Continuation of application No. 13/429,618, filed on Mar. 26, 2012, now Pat. No. 8,330,626.

(51) **Int. Cl.**
G08B 21/00 (2006.01)

(52) **U.S. Cl.**
USPC **340/988**; 340/989; 340/990; 340/991; 701/1; 701/2; 348/116

(58) **Field of Classification Search**
USPC 340/988–994; 701/1, 2, 32.3, 454, 467, 701/482, 485; 348/116
See application file for complete search history.

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Notice of Allowance of corresponding U.S. Appl. No. 13/409,281, dated Jun. 28, 2012.

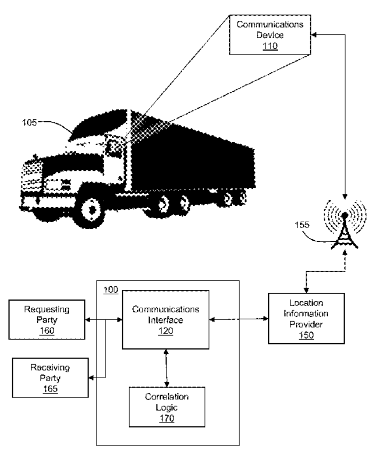
* cited by examiner

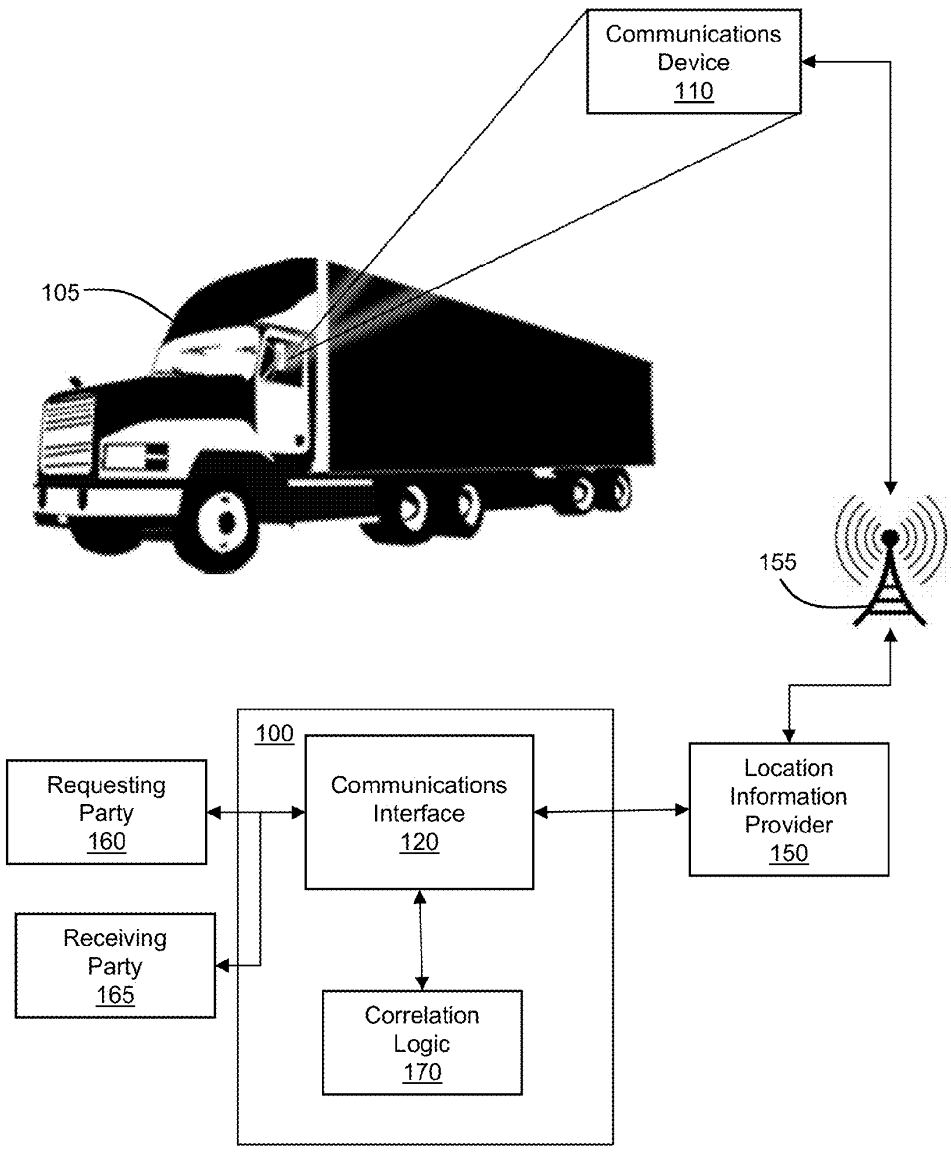
Primary Examiner — Mohammad Ghayour
Assistant Examiner — Mark Rushing
(74) *Attorney, Agent, or Firm* — Renner, Otto, Boisselle & Sklar, LLP

(57) **ABSTRACT**

A system for providing location information of a vehicle includes a communications interface and a correlation logic that correlates location information of a communications device to location of the vehicle. The communications interface communicates electronic signals including: a first signal including data representing a request for the location of the vehicle, a second signal transmitted to a location information provider corresponding to a party or device other than the communications device including data representing a request for location information of the communications device, a third signal received from the location information provider corresponding to the party or device other than the communications device including data representing the location information of the communications device, and a fourth signal including data representing the location of the vehicle.

12 Claims, 10 Drawing Sheets





Communications Device 110
105
155
100
Requesting Party 160
Receiving Party 165
Communications Interface 120
Correlation Logic 170
Location Information Provider 150

Figure 1

200

220 230

	Active Driver 210a	Active Device 110a	Backup Driver 210b	Backup Device 110b	Total Capacity ft³ / lbs.	Available Capacity ft³ / lbs.
105a	Bianchi Campagnolo	(143) 846-5405	Bob Haro	(443) 240-5465	4,013 42,660	4,013 42,660
105b	Gary Fisher	(546) 542-1235			3,931 42,010	2,531 22,010
105c	Merlin Cannondale	(242) 643-5461	Malvern Star	(563) 543-5865	2,878 Ref. 36,280	0 Ref. 0
105d	Colnago Cinelli	(563) 543-5635	Ross Raleigh	(243) 546-5435	2,878 Ref 36,280	2,878 Ref. 36,280
105e	Pinerallo De Rosa	(843) 446-2475	Giant Trek	(587) 847-5635	3,931 42,010	3,268 41,700
105f	Emilio Bozzi	(507) 543-5475	Murray Schwinn	(548) 243-5433	3,268 41,700	0 0
105g	Freddie Grubb	(843) 243-3685	Marin Huffy	(509) 343-5265	4,013 42,660	0 0

Figure 2

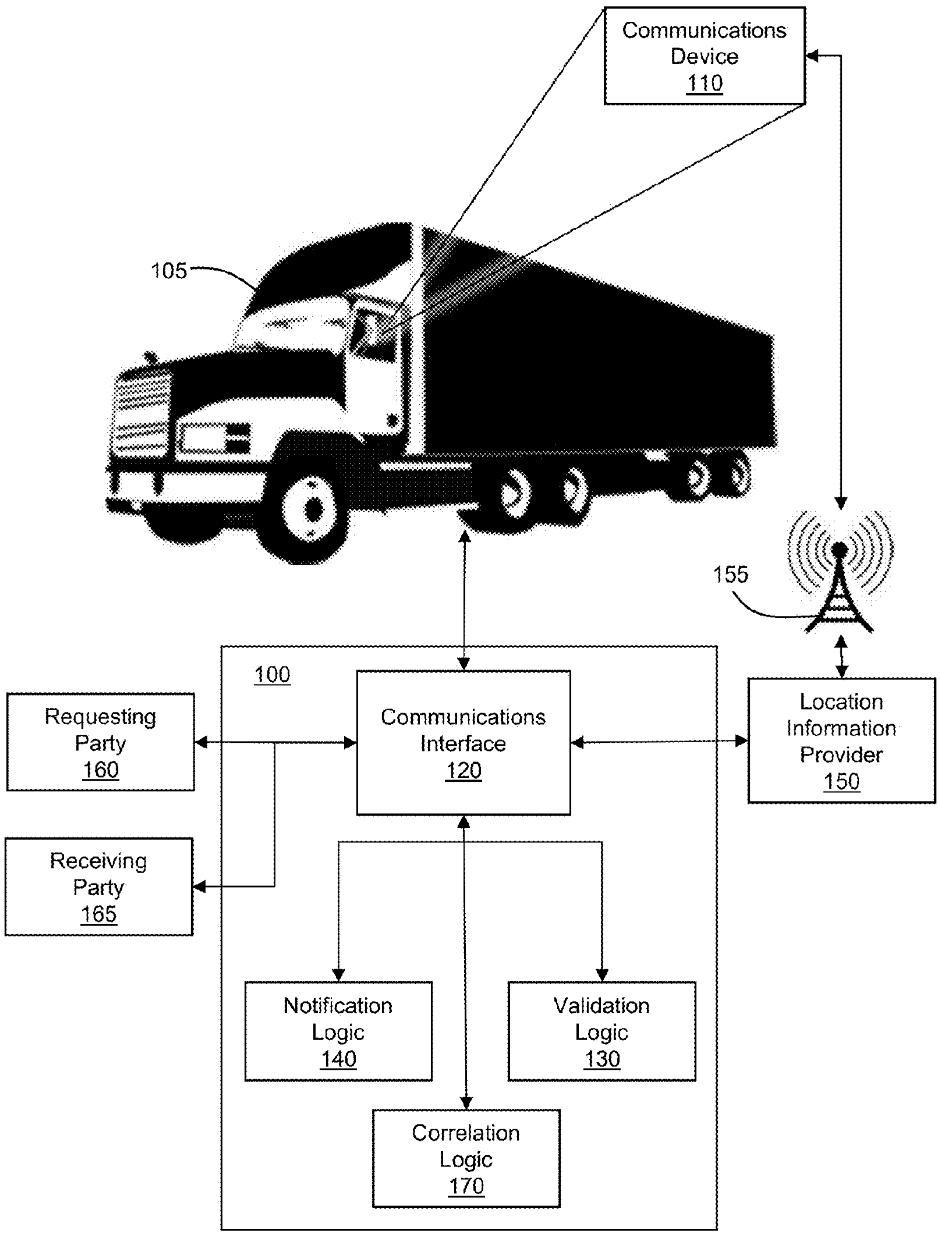

Communications Device 110
105
155
100
Requesting Party 160
Communications Interface 120
Location Information Provider 150
Receiving Party 165
Notification Logic 140
Validation Logic 130
Correlation Logic 170

Figure 3

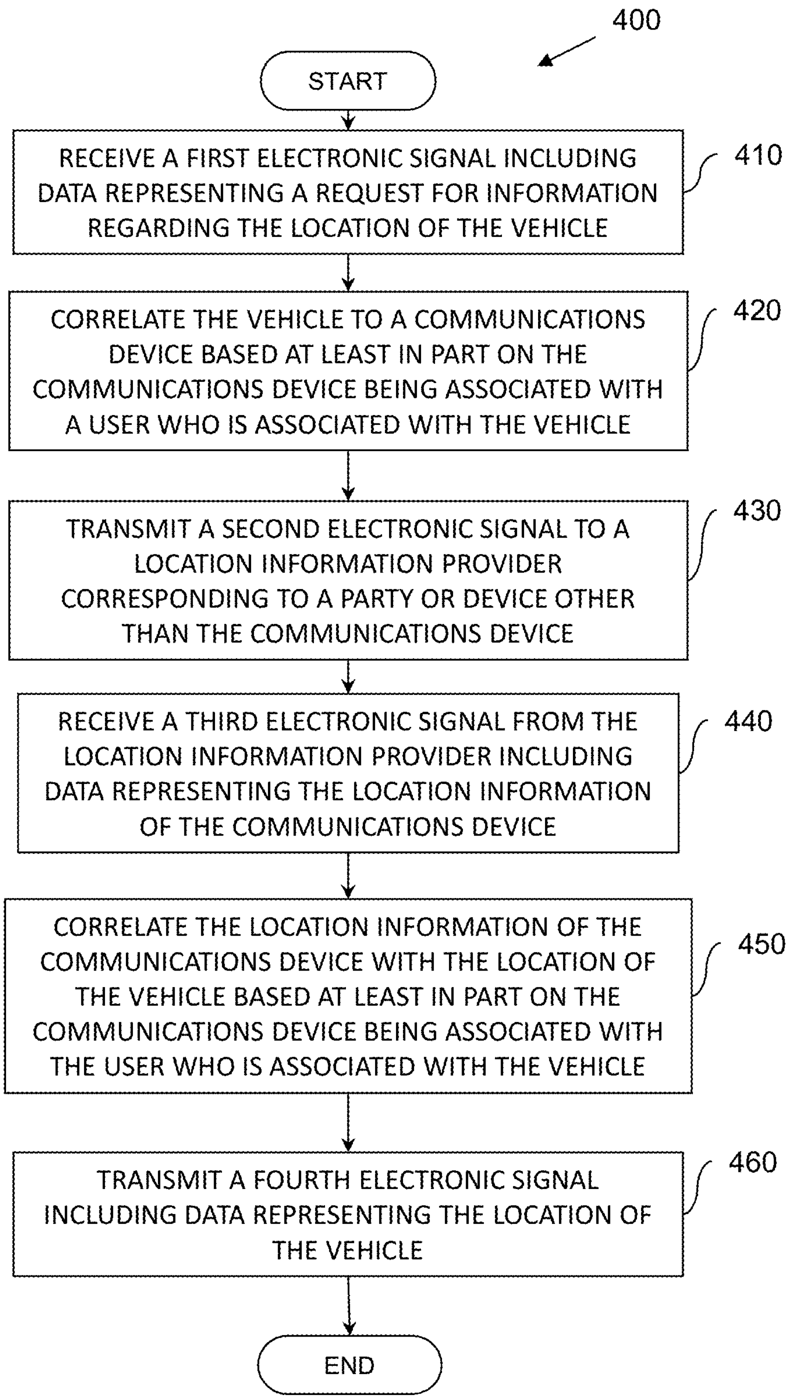

400
START
RECEIVE A FIRST ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING A REQUEST FOR INFORMATION REGARDING THE LOCATION OF THE VEHICLE
410
CORRELATE THE VEHICLE TO A COMMUNICATIONS DEVICE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH A USER WHO IS ASSOCIATED WITH THE VEHICLE
420
TRANSMIT A SECOND ELECTRONIC SIGNAL TO A LOCATION INFORMATION PROVIDER CORRESPONDING TO A PARTY OR DEVICE OTHER THAN THE COMMUNICATIONS DEVICE
430
RECEIVE A THIRD ELECTRONIC SIGNAL FROM THE LOCATION INFORMATION PROVIDER INCLUDING DATA REPRESENTING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
440
CORRELATE THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE WITH THE LOCATION OF THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER WHO IS ASSOCIATED WITH THE VEHICLE
450
TRANSMIT A FOURTH ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING THE LOCATION OF THE VEHICLE
460
END

Figure 4

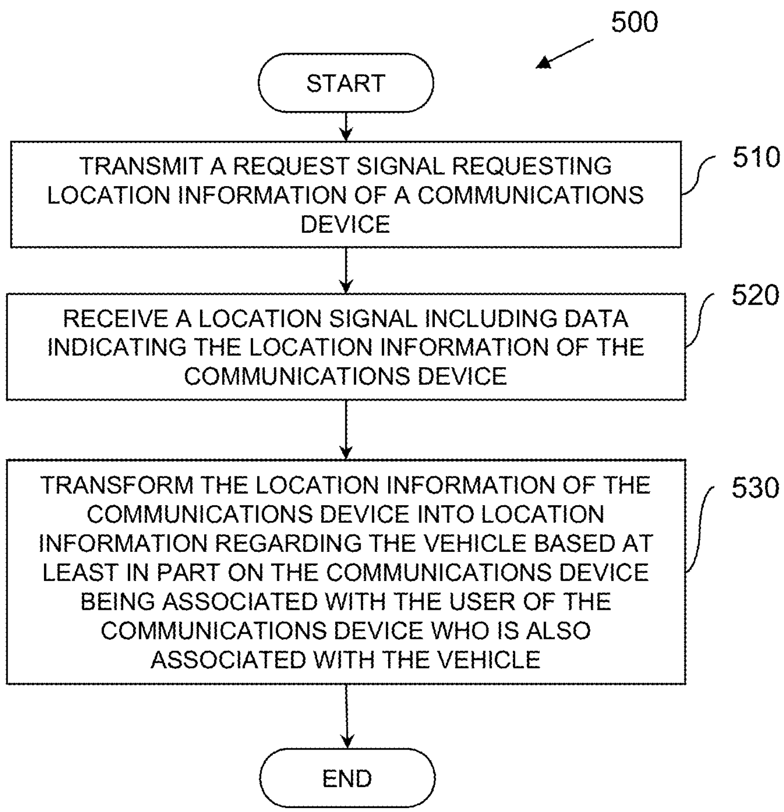

500
START
TRANSMIT A REQUEST SIGNAL REQUESTING LOCATION INFORMATION OF A COMMUNICATIONS DEVICE
510
RECEIVE A LOCATION SIGNAL INCLUDING DATA INDICATING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
520
TRANSFORM THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE INTO LOCATION INFORMATION REGARDING THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER OF THE COMMUNICATIONS DEVICE WHO IS ALSO ASSOCIATED WITH THE VEHICLE
530
END

Figure 5

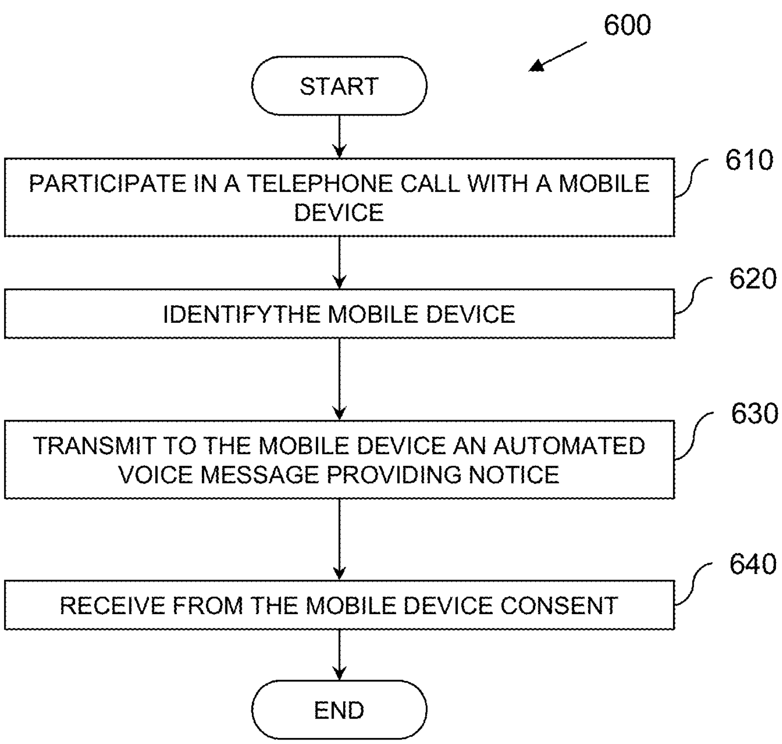

600
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
610
IDENTIFYTHE MOBILE DEVICE
620
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE PROVIDING NOTICE
630
RECEIVE FROM THE MOBILE DEVICE CONSENT
640
END

Figure 6

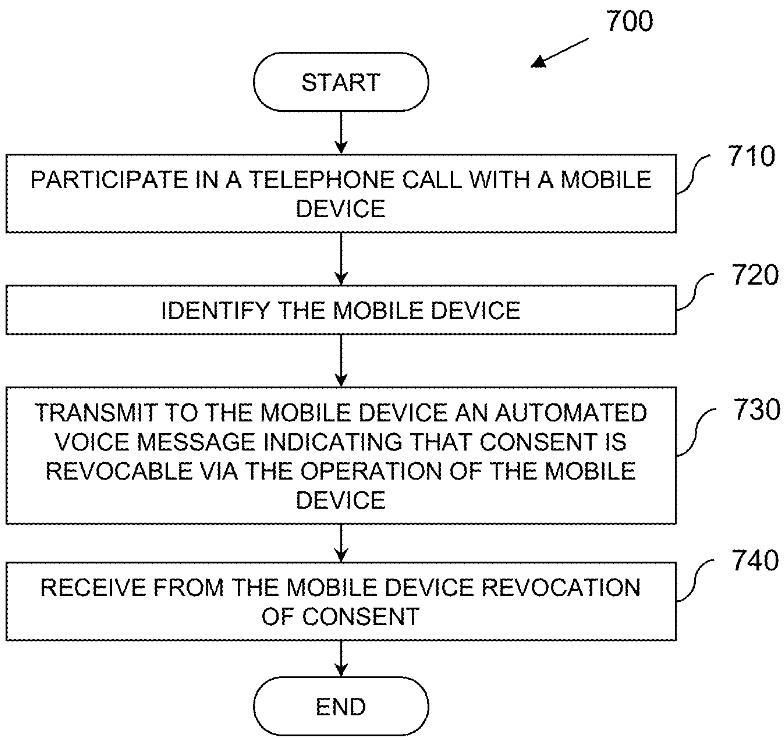

700
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
710
IDENTIFY THE MOBILE DEVICE
720
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE INDICATING THAT CONSENT IS REVOCABLE VIA THE OPERATION OF THE MOBILE DEVICE
730
RECEIVE FROM THE MOBILE DEVICE REVOCATION OF CONSENT
740
END

Figure 7

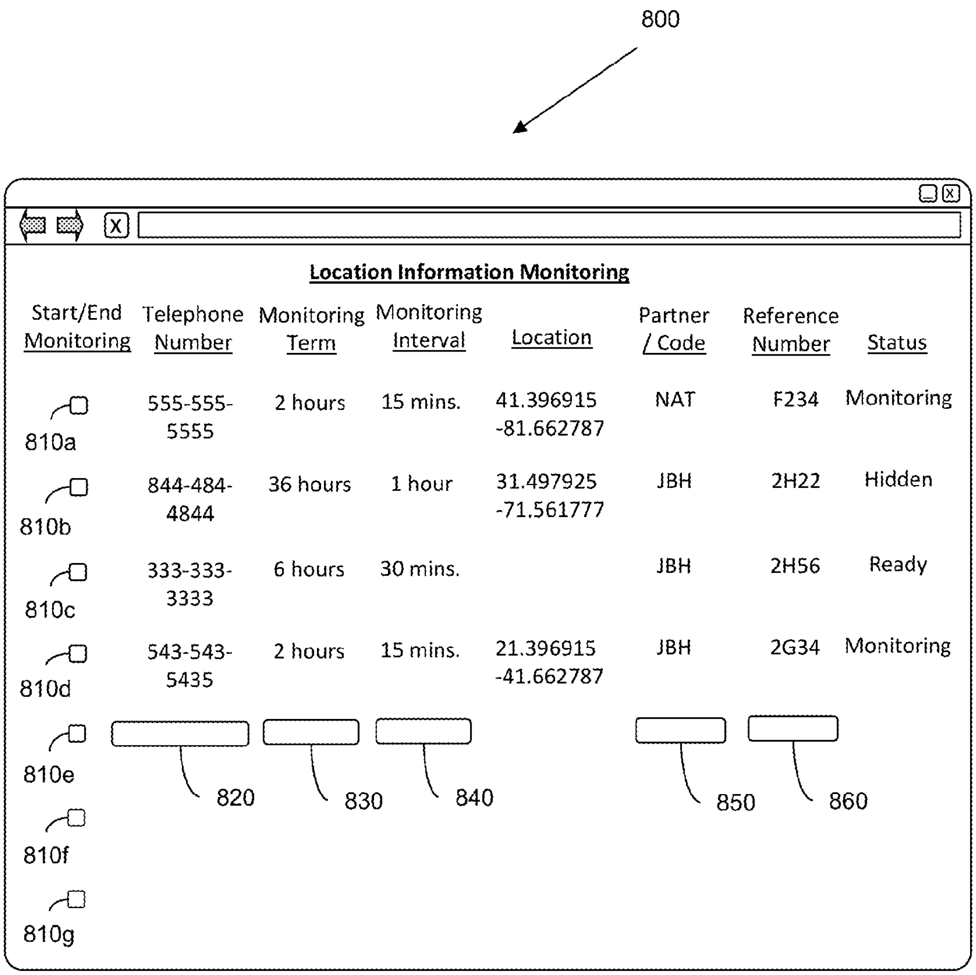

800
Location Information Monitoring
Start/End Monitoring
Telephone Number
Monitoring Term
Monitoring Interval
Location
Partner / Code
Reference Number
Status
810a
555-555-5555
2 hours
15 mins.
41.396915 -81.662787
NAT
F234
Monitoring
810b
844-484-4844
36 hours
1 hour
31.497925 -71.561777
JBH
2H22
Hidden
810c
333-333-3333
6 hours
30 mins.
JBH
2H56
Ready
810d
543-543-5435
2 hours
15 mins.
21.396915 -41.662787
JBH
2G34
Monitoring
810e
810f
810g
820
830
840
850
860

Figure 8

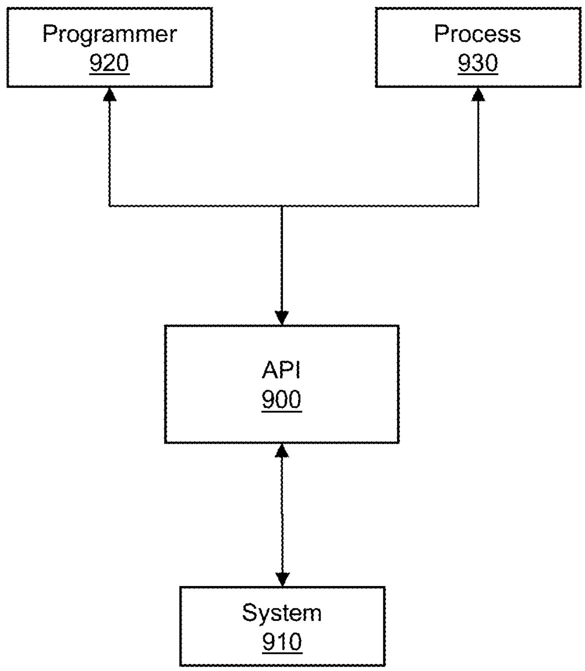


Figure 9

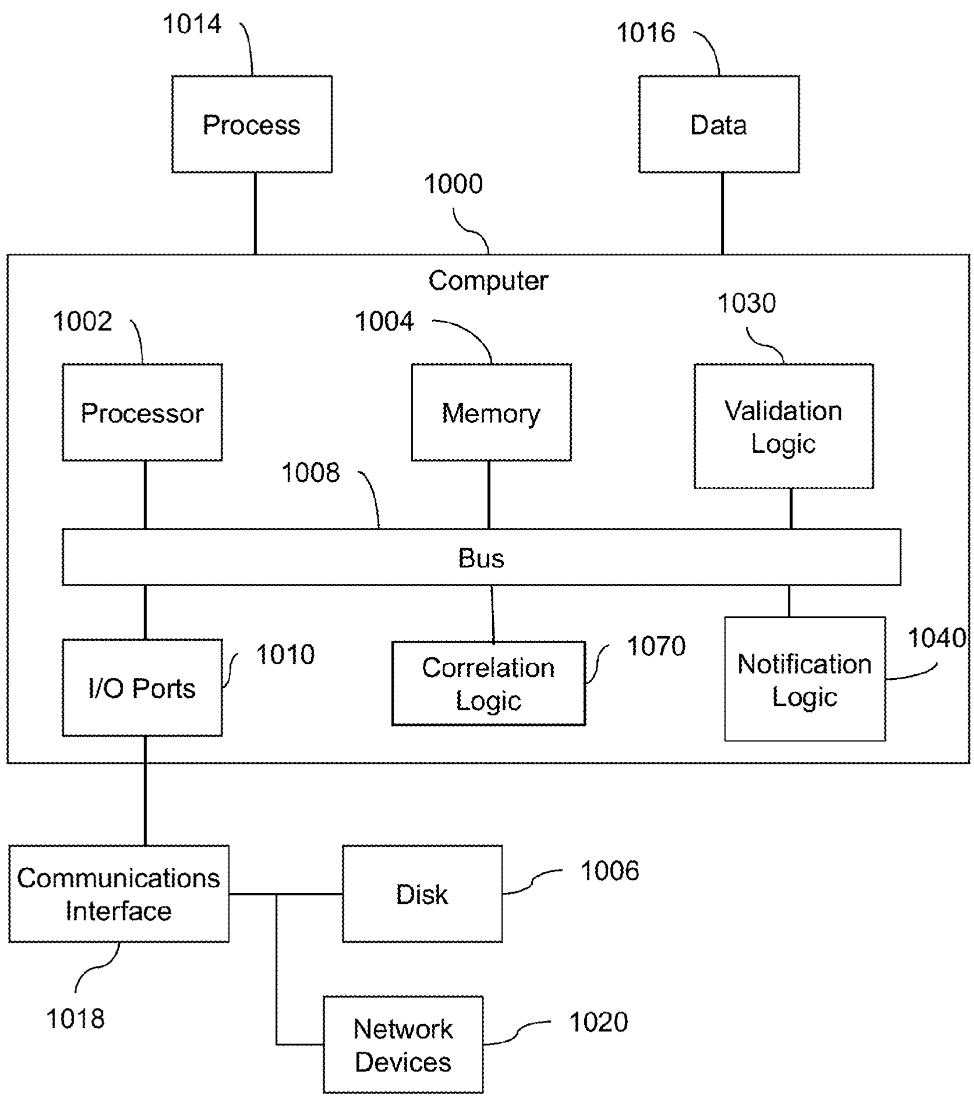

1014
Process
1016
Data
1000
Computer
1002
Processor
1004
Memory
1030
Validation Logic
1008
Bus
I/O Ports
1010
Correlation Logic
1070
Notification Logic
1040
Communications Interface
Disk
1006
1018
Network Devices
1020

Figure 10

SYSTEMS AND METHODS FOR MONITORING LOCATION OF FREIGHT CARRIED BY A VEHICLE

This application is a continuation of U.S. application Ser. No. 13/429,618, filed Mar. 26, 2012, which is incorporated by reference.

TECHNICAL FIELD

The present disclosure relates to systems and methods for monitoring location of vehicles.

BACKGROUND

Location information is becoming more important and prevalent.

In one example application of the use of location information, carriers, shippers, freight hauling services providers, third-party logistics service providers and courier services providers as well as other logistics and freight service providers (freight hauling) benefit from monitoring the location of vehicles in their fleets or under contract. Monitoring the location of vehicles helps improve efficiency because it allows for real-time or near real-time decision making when matching loads with vehicles. For example, by monitoring the location of fleet vehicles, a dispatcher may better understand which vehicle is the most appropriate (e.g., geographically closest, appropriate size, etc.) to send to a location for a load pickup. Conventional systems for monitoring vehicle location have relied on global positioning systems (GPS) to provide the vehicle's location. These systems require a GPS receiver to be installed in each vehicle. Moreover, some of these systems require the installation of additional dedicated equipment in each vehicle.

In addition, at least in part due to limitations of conventional systems for monitoring vehicle location, a common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This practice may represent a substantial cost to a user or organization that, for example, may wish to monitor a relatively small number of vehicles or a relatively small number of loads for a relatively short amount of time.

SUMMARY

Alternative methods for monitoring location of vehicles include radiolocation techniques including triangulation or multilateration methods that are capable of locating devices in a network. These methods involve the measurement of radio signals between a device and radio towers in the network. The technology, originally intended by telecommunication companies to approximate the location of a mobile phone in case of emergencies, provides the location of a device in the network.

The use of all of these location information technologies also raises privacy issues. A user's privacy may be at risk if location information is misused or disclosed without the authorization or knowledge of the user. To address these privacy concerns, various governmental and business organizations have developed rules and guidelines to protect user privacy. For example, the International Association for the Wireless Telecommunications Industry (CTIA) has developed Best Practices and Guidelines for Location-Based Services (the "CTIA Guidelines"), which are hereby incorporated by reference.

The Guidelines provide a framework based on two principles: user notice and consent. Users must receive "meaningful notice about how location information will be used, disclosed and protected so that users can make informed decisions . . . and . . . have control over their location information." Users must also "consent to the use or disclosure of location information" and "have the right to revoke consent . . . at any time."

Although, electronic methods have been developed that make use of web browsers and SMS texting capabilities of mobile devices to provide notification and consent, some of these systems have proved inconvenient and may require advanced mobile devices or extensive user training.

A computer implemented method for monitoring location of a vehicle includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle, correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle, and transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes receiving a third electronic signal from the location information provider. The third electronic signal includes data representing the location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, and transmitting a fourth electronic signal including data representing the location of the vehicle.

Another computer implemented method for monitoring location of a vehicle includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device and the communications device is associated with a user of the communications device who is associated with the vehicle. The computer implemented method for monitoring location of a vehicle further includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device and the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. The computer implemented method for monitoring location of a vehicle further includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

A system for monitoring location of a vehicle includes a communications interface configured to communicate electronic signals including: a first electronic signal including data representing a request for the location of the vehicle, the first electronic signal received from a requesting party, a second electronic signal including data representing a request for location information of a communications device, wherein the second electronic signal is transmitted to a location information provider corresponding to a party or device other than the communications device, wherein the communications device is associated with a user of the communica-

tions device who is associated with the vehicle, a third electronic signal including data representing the location information of the communications device, wherein the third electronic signal is received from the location information provider corresponding to the party or device other than the communications device, and a fourth electronic signal including data representing the location of the vehicle, the fourth electronic signal transmitted to a receiving party. The system for monitoring location of a vehicle further includes a correlation logic configured to correlate the location information of the communications device to the location of the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various example systems, methods, and so on, that illustrate various example embodiments of aspects of the invention. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

FIG. **1** illustrates an exemplary system for monitoring the location of a vehicle.

FIG. **2** illustrates a simplified exemplary chart illustrating how a correlation logic may correlate a vehicle to a communications device or the location of the vehicle to the location information of the communications device.

FIG. **3** illustrates the exemplary system for monitoring the location of a vehicle with additional details.

FIG. **4** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **6** illustrates a flow diagram for an exemplary method for receiving consent from a user to monitoring the location of a vehicle associated with the user.

FIG. **7** illustrates a flow diagram for an exemplary method for receiving from a user a revocation of consent to monitoring the location of a vehicle associated with the user.

FIG. **8** illustrates an exemplary user interface for use in conjunction with a system for monitoring the location of a vehicle.

FIG. **9** illustrates an application programming interface (API) providing access to a system for monitoring the location of a vehicle.

FIG. **10** illustrates a computer where systems or methods for monitoring the location of a vehicle may be implemented.

DETAILED DESCRIPTION

Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

In the present disclosure, embodiments are described in the context of location of freight hauling vehicles. It will be appreciated, however, that the exemplary context of freight hauling vehicles is not the only operational environment in which aspects of the disclosed systems and methods may be used. Therefore, the techniques described in this disclosure may be applied to many types of apparatus, vehicles or devices whose location information may be of interest.

FIG. **1** illustrates an exemplary system **100** for monitoring the location of a vehicle **105**, which has a communication device **110** within the vehicle **105**. The system **100** includes a communications interface **120** that communicates with devices external to the system **100** via electronic signals. For example, the communications logic **120** is configured to communicate with a location information provider **150**, a requesting party **160**, and a receiving party **165**.

The location information provider **150** corresponds to a party or device other than the vehicle **105** and the device **110**. The location information provider **150** has access to location of the vehicle **105** or the device **110**. In one embodiment, the location information provider **150** is a wireless service provider that provides wireless service in a network **155**. In another embodiment, the location information provider **150** is a third party or device that receives the location information of the device **110** from the wireless service provider or from some other party or device. In yet another embodiment, the location information provider **150** is a party other than a wireless service provider or a third party. For example, the party seeking to monitor the location of the vehicle **105**, the requesting party **160**, may have access to the location information of the device **110**. In that case, the requesting party **160** may also be the location information provider **150**. In another example, the party operating the system **100** may have access to the location information of the device **110**.

The requesting party **160** corresponds to a party or device interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. The receiving party **165** corresponds to a party or device who receives the location of the vehicle **105** from the system **100** to monitor the location of the vehicle **105**. In an example involving freight hauling services providers or freight carriers, a carrier who is interested in monitoring the location of its own vehicles, vehicles under contract, or other vehicles requests the ability to monitor the location of the vehicle **105** for its own consumption. In this case, the carrier is both the requesting party **160** and the receiving party **165**. In another example, the requesting party **160** may be a driver interested in sharing the location of his/her vehicle **105** with a carrier to allow the carrier to monitor the location of the vehicle **105**. In this case, the driver is the requesting party **160** and the carrier is the receiving party **165**. In one embodiment, multiple par-

ties or devices may be interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. In that case, the communications interface **120** is configured to communicate with multiple requesting parties and/or multiple receiving parties.

The system **100** further includes a correlation logic **170** that correlates the vehicle **105** and the device **110**. In one embodiment, the correlation logic **170** correlates the vehicle **105** and the device **110** based at least in part on the vehicle **105** being associated with at least one user who is also associated with the device **110**. For example, the user may be associated with the vehicle **105** because the user is the designated driver of the vehicle **105** and the user may be associated with the communications device **110** because the user is under contract with a wireless service provider for the provider to provide wireless service to the communications device **110**. In another example, the user is associated with the vehicle **105**, with the device **110**, or with both in a database or in the correlation logic **170**. In another embodiment, the vehicle **105** is directly associated with the communications device **110** without a user being associated with the vehicle **105** or with the device **110**.

In an example of the operation of the system **100**, the requesting party **160** transmits and the communications interface **120** receives data representing a request from the requesting party **160** for the ability to monitor the location of the vehicle **105**. In response to the request from the requesting party **160**, the correlation logic **170** correlates the vehicle **105** to the device **110**. The communications interface **120** transmits to the location information provider **150** data representing one or more requests for location information of the device **110**. In response to a request for location information of the device **110**, the location information provider **150** transmits and the communications interface **120** receives data representing the location information of the device **110**. The correlation logic **170** correlates the location information of the device **110** to the location of the vehicle **105**.

With the location of the vehicle **105** on hand, the communication interface **120** can transmit data representing the location of the vehicle **105** to the receiving party **165** through computer communication. The location of the vehicle **105** may then be displayed in a user interface (not shown). In another embodiment, the communications interface **120** is configured to communicate the location to the receiving party **165** by exposing an application programming interface (API) through which the receiving party **165** can access the location of the vehicle **105**. The receiving party **165** can make use of the API to make the information available to its enterprise software (e.g., SAP, Oracle, etc.) for example.

FIG. **2** illustrates a simplified exemplary chart **200** illustrating how the correlation logic **170** may correlate the vehicle **105** to the device **110** or the location of the vehicle **105** to the location information of the device **110**. In the illustrated embodiment, for each vehicle **105***a-g* registered in the system **100**, the correlation logic **170** has data fields corresponding to each vehicle **105***a-g*. The data fields include information regarding the vehicles **105***a-g*. Potential information that may be included in the data fields include one or more drivers **210***a-b* associated with each of the vehicles **105***a-g* and one or more devices **110***a-b* associated with each of the drivers **210***a-b*, respectively. The drivers **210***a-b* are identified by name while the devices **110***a-b* are identified by an identifier, which in this case corresponds to a telephone number associated with the respective device **110***a-b*.

In other embodiments, the identifier corresponds to a number or some other identifying information associated with the device **110** other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

Additional information that may be included in the data fields include the capacity of a vehicle **105***a-g* (e.g., total volumetric and weight capacity **220**, available volumetric and weight capacity **230**, etc.), whether the container is refrigerated Ref., and so on.

In the illustrated embodiment, the vehicle **105***a* is associated with an active driver **210***a* named Bianchi Campagnolo who is associated with an active device **110***a* identified by an identifier corresponding to the telephone number (143) 846-5405. The vehicle **105***a* may also be associated with a backup driver named Bob Haro who is associated with a backup device **110***b* identified by an identifier corresponding to the telephone number (443) 240-5465. The correlation logic **170** correlates the vehicle **105** with the active driver **210***a* unless the correlation logic **170** is instructed to instead use the backup driver **210***b*. In that case, the active driver **210***a* and the backup driver **210***b* may switch, with the name listed under backup driver **210***b* appearing under active driver **210***a* and viceversa. Similarly, the correlation logic **170** correlates the vehicle **105** with the active device **110***a* unless the correlation logic **170** is instructed to instead use the backup device **110***b*. In that case, the active device **110***a* and the backup device **110***b* may switch, with the identifier listed under backup device **110***b* appearing under active device **110***a* and viceversa. In this way, the correlation logic **170** can transform the location information of the communications device **110** into information regarding the location of the vehicle **105** by correlating the location information of the communications device **110** to the location of the vehicle **105** based at least in part on the communications device **110** being associated with the user who is associated with the vehicle **105**. In one embodiment, the correlation logic **170** correlates the vehicle **105** with the active driver **210***a* and the backup driver **210***b*.

In the illustrated embodiment, the vehicle **105***a* has a total capacity of 4,013 pounds and 42,660 cubic feet of which 4,013 pounds and 42,660 cubic feet are currently available. The vehicle **105***c* has a total capacity of 2,878 pounds and 36,280 cubic feet. The capacity of the vehicle **105***c* is refrigerated capacity. However, none of that capacity is currently available (e.g., the container associated with the vehicle **105***c* is full) since the available capacity is indicated as 0 pounds and 0 cubic feet.

FIG. **3** illustrates the exemplary system **100** for monitoring the location of a vehicle **105** with additional details.

As described above, the system **100** receives the location information of the device **110** from a location information provider **150**, which is a party or device other than the device **110**. The location information provider **150** may be a wireless service provider or a party or device that receives the location information from a wireless service provider. Examples of wireless service providers in the United States include Verizon Wireless, AT&T Mobility, Sprint Nextel, T-Mobile, etc. These wireless service providers have technologies deployed that allow them to approximate the location of devices in their network. Some of these technologies were developed and deployed in compliance with E911, a government mandate requiring the wireless service providers to provide the approximate location of a mobile device in case of an emergency.

Location of devices in a cellular network may be described as involving two general positioning techniques: 1) techniques that require the device to incorporate a global positioning system (GPS) receiver, and 2) techniques that use some form of radiolocation from the device's network and do not require the device to incorporate a GPS receiver.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a radiolocation technique where the approximated location of the device **110** corresponds to a range of locations corresponding to a transmission range of a single radio tower **155**. In an example of this technology, each radio tower is assigned a unique identification number, a Cell-ID. The Cell-ID is received by all mobile devices in the coverage area of the radio tower **155**, thus the position of the device **110** in the coverage area of the radio tower **155** is derived from the coordinates of the radio tower **155**. Additional techniques, such as measuring signal strength of the device **110** could be used to increase the accuracy of the location information. Accuracy can be further enhanced by including a measurement of Timing Advance (TA) in GSM/GPRS networks or Round Trip Time (RTT) in UMTS networks. TA and RTT use time offset information sent from the radio tower **155** to adjust the communications device's relative transmit time to correctly align the time at which the communications device's signal arrives at the radio tower **155**. These measurements can be used to determine the distance from the communications device to the radio tower **155**, further improving accuracy.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part using triangulation between multiple radio towers such as tower **155**. The location of the device **110** may be determined by using one or a combination of several techniques including the following:

Angle of Arrival (AOA)—This technique requires at least two radio towers and locates the device **110** at the point where the lines along the angles from each tower intersect.

Time Difference of Arrival (TDOA)—This technique also requires at least two radio towers and determines the time difference between the time of arrival of a signal from the device **110** to the first tower **155**, to a second tower, and so on.

Advanced Forward Link Trilateration (AFLT)—In this technique the communications device measures signals from nearby towers such as radio tower **155**, which are then used to triangulate an approximate location of the device **110**.

Enhanced-observed time difference (E-OTD)—This technique takes data received from the nearby towers such as radio tower **155** to measure the difference in time it takes for the data to reach the device **110**. The time difference is used to calculate where the device **110** is in relation to the radio towers.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique not requiring a GPS satellite receiver to form part of the device **110**. In another embodiment the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a hybrid method including a technique requiring a GPS satellite receiver to form part of the device **110** and a technique not requiring a GPS satellite receiver to form part of the device **110**. In yet another embodiment, the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique requiring a GPS satellite receiver to form part of the device **110**.

However, since the system **100** obtains the location information from the location information provider **150** and not from the device **110**, the system **100** can be operated to monitor the location of devices incorporating a GPS satellite receiver as well as devices not incorporating a GPS satellite receiver. Thus, the system **100** does not rely on any particular positioning technology for obtaining the location of the vehicle **105**.

In continued reference to FIG. **3**, the system **100** provides user notification and receives user consent to the monitoring the location of the vehicle **105**. In this embodiment, the communications interface **120** is further configured for communication with the device **110**. In one embodiment, the communication interface **120** is associated with a toll free number such as a 1-800 number. The driver of the vehicle **105** may initiate a telephone call by dialing the toll free number. In another embodiment, the communications interface is associated with a number other than a toll free number. In yet another embodiment, the communications interface **120** is configured to initiate the telephone call.

In one embodiment, the system **100** further includes a validation logic **130** that is configured to identify the device **110** at least in part by obtaining the identifier associated with the device **110**. Obtaining the identifier associated with the device **110** ensures that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) is notified that location of the vehicle **105** will be monitored and that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) consents to the monitoring of the location. In one embodiment, the identifier is a telephone number associated with the device **110**. In one embodiment, where the communications interface **120** is associated with a toll free number as discussed above, the validation logic **130** is configured to identify the device **110** at least in part by obtaining the telephone number associated with the device **110** via automatic number identification (ANI). As discussed above in reference to FIG. **2**, in other embodiments, the identifier may be an identifier other than a telephone number.

The system **100** further includes a notification logic **140** that is configured to communicate a signal including data representing an automated voice message. In one embodiment, the automated voice message provides a notice that includes information indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. In another embodiment, the automated voice message provides a location (web address, etc.) where the notice may be found indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. For example, the automated voice message may indicate that the notice may be found at a web address and provide the web address.

The communications interface **120** is configured to transmit the automated voice message to the device **110**. The communications interface **120** is further configured to receive from the device **110** data indicating the user consent to monitoring of the location of the vehicle **105**.

In one embodiment, the automated voice message communicates that user's consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate your consent to

revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive data indicating that an action was performed on the device **110**, which indicates the user's consent (e.g., the user pressed **1**).

In another embodiment, the automated voice message communicates that the user's consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your consent to revealing your location, please say 'yes.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's consent (e.g., the user said "yes").

In one embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** and receives the location information of the communications device **110**. The request for the location information of the device **110** includes the identifier associated with the device **110**.

In the illustrated embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** to a location information provider **150** and receives the location information of the communications device **110** from the location information provider **150**.

In one embodiment, the notification logic **140** is further configured to communicate a signal including data representing a second automated voice message indicating that consent to the monitoring of the location of the vehicle **105** is revocable via the device **110**. In this embodiment, the communications interface **120** is configured to communicate to the device **110** the second automated voice message and to receive confirmation of consent or revocation of consent to the monitoring of the location of the vehicle **105** from the device **110**.

In one embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate that you wish to revoke consent to revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive data indicating that an action was performed on the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user pressed **1**).

In another embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your confirmation of consent to revealing your location, please say 'confirmed.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user said "confirmed").

In one embodiment, the user is given the option to temporarily revoke consent to the disclosure of location information. For example, a driver may wish to make available his location to a carrier during certain hours during the work week, but may not want the carrier to be able to obtain the driver's location during the weekend. The driver may operate the device **110** to indicate a date and time when the driver wishes for the monitoring of the location of the vehicle **105** to end or resume. Or the driver may operate the device **110** to indicate an interval of time (e.g., 2 hours) during which the driver wishes to hide the location of the vehicle **105**. In this embodiment, the communications interface **120** is configured to receive data indicating a time until which consent to the monitoring of the location of the vehicle **105** is granted or revoked, or an interval of time during which consent to the monitoring of the location of the vehicle **105** is granted or revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "share" using the device **110**. In this embodiment, the communications interface **120** is configured to receive the text message as sent by the device **110**, which indicates the user's confirmation or revocation of consent. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle **105**, respectively. In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent.

In one embodiment, when the location of the vehicle **105** is being disclosed, the notification logic **140** is further configured to periodically generate and the communications interface **120** is further configured to periodically communicate a reminder notification message indicating that the location of the vehicle **105** is currently being disclosed. In one embodiment, the system **100** reminds the user every 30 days that the location of the vehicle **105** is currently being disclosed. In another embodiment, the system **100** reminds the user more or less often than every 30 days that the location of the vehicle **105** is currently being disclosed.

In one embodiment, the communications interface **120** reminds the user in an automated voice message that the location of the vehicle **105** is currently being disclosed. In another embodiment, the communications interface **120** reminds the user in an SMS message that the location of the vehicle **105** is currently being disclosed. In yet another embodiment, the communications interface **120** reminds the user via electronic communication other than an automated voice message or an SMS message that the location of the vehicle **105** is currently being disclosed.

Example methods may be better appreciated with reference to the flow diagrams of FIGS. **4** through **7**. While for purposes of simplicity of explanation, the illustrated methodologies are shown and described as a series of blocks, it is to be appreciated that the methodologies are not limited by the order of the blocks, as some blocks can occur in different orders or concurrently with other blocks from that shown or described. Moreover, less than all the illustrated blocks may be required to implement an example methodology. Furthermore, additional or alternative methodologies can employ additional, not illustrated blocks.

In the flow diagrams, blocks denote "processing blocks" that may be implemented with logic. The processing blocks may represent a method step or an apparatus element for performing the method step. A flow diagram does not depict syntax for any particular programming language, methodology, or style (e.g., procedural, object-oriented). Rather, a flow diagram illustrates functional information one skilled in the art may employ to develop logic to perform the illustrated processing. It will be appreciated that in some examples, program elements like temporary variables, routine loops,

and so on, are not shown. It will be further appreciated that electronic and software applications may involve dynamic and flexible processes so that the illustrated blocks can be performed in other sequences that are different from those shown or that blocks may be combined or separated into multiple components. It will be appreciated that the processes may be implemented using various programming approaches like machine language, procedural, object oriented or artificial intelligence techniques.

In one example, methodologies are implemented as processor executable instructions or operations provided on a computer-readable medium. Thus, in one example, a computer-readable medium may store processor executable instructions operable to perform the methods of FIGS. **4** through **7**.

While FIGS. **4** through **7** illustrate various actions occurring in serial, it is to be appreciated that various actions illustrated in FIGS. **4** through **7** could occur substantially in parallel. While a number of processes are described, it is to be appreciated that a greater or lesser number of processes could be employed and that lightweight processes, regular processes, threads, and other approaches could be employed. It is to be appreciated that other example methods may, in some cases, also include actions that occur substantially in parallel.

FIG. **4** illustrates a flow diagram for an exemplary method **400** for monitoring location of a vehicle. At **410**, the method **400** includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle. At **420**, the method **400** includes correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle. At **430**, the method **400** includes transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. In one embodiment, the second electronic signal includes data representing a telephone number associated with the communications device.

At **440**, the method **400** includes receiving a third electronic signal from the location information provider including data representing the location information of the communications device. At **450**, the method **400** includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle. At **460**, the method **400** includes transmitting a fourth electronic signal including data representing the location of the vehicle. In one embodiment, the transmitting the fourth electronic signal including data representing the location of the vehicle includes exposing an application programming interface (API) from which the requesting party can access the location of the vehicle.

In one embodiment, the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device. In one embodiment, the location information of the communications device is originally obtained using a method including at least one of: advance forward link trilateration (AFLT), observed time difference (OTD), Cell-ID (CID), and obtaining a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the user of the communications device is a driver of the vehicle. In one embodiment, the location information provider corresponds to one of: a wireless service provider providing wireless service to the communications device or a third party that obtains the location information from the wireless service provider providing wireless service to the communications device. In one embodiment, the requesting party corresponds to one of: a freight service provider wherein the location of the vehicle is transmitted to the freight service provider for the freight service provider to have access to location of freight carried by the vehicle, or the driver of the vehicle requesting that the location of the vehicle be transmitted to a freight service provider for the freight service provider to have access to location of freight carried by the vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method **500** for monitoring location of a vehicle. At **510**, the method **500** includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device. The communications device is associated with a user of the communications device who is also associated with the vehicle. At **520**, the method **500** includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device.

At **530**, the method **500** includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle.

In one embodiment, the location information of the communications device is originally obtained by a wireless service provider providing wireless service to the communications device. In one embodiment, the location information of the communications device includes location information obtained in compliance with E911. In one embodiment, the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. In one embodiment, the location information of the communications device is originally obtained through triangulation between radio towers. In one embodiment, the location information of the communications device is originally obtained using a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the location signal is received from one of: a wireless service provider, or a third party who receives the location information from the wireless service provider.

FIG. **6** illustrates a flow diagram for an exemplary method **600** for receiving consent from a user for monitoring the location of a vehicle associated with the user. At **610**, the method **600** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user of the communications device initiates the telephone call. In another embodiment, the user of the communications device receives the telephone call. At **620**, the method **600** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the communications device user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI).

In other embodiments, the identifier is an identifier other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial

number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

At **630**, the method **600** includes transmitting to the communications device a signal including data representing an automated voice message. The automated voice message communicates to the user of the communications device at least one of: (a) a notice including information indicating that consenting to the monitoring of the location of the vehicle would result in the location of the vehicle or the location of the communications device being disclosed, or (b) a location at which to find the notice. At **640**, the method **600** includes receiving from the user via the communications device consent for monitoring the location of the vehicle.

In one embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, once consent has been obtained from the user of the communications device, the method **600** includes periodically communicating to the user via the communications device a notification message indicating that the location is being disclosed.

In one embodiment, after receiving from the user consent for monitoring the location of the vehicle, the method **600** includes transmitting a request for the location information of the communications device and receiving the location information of the communications device.

In one embodiment, after receiving the location information of the communications device, the method **600** includes communicating the location of the vehicle to a receiving party. In one embodiment, communicating the location of the vehicle to a receiving party includes: (a) transmitting the communicating the location of the vehicle to the receiving party through computer communication, or (b) exposing an application programming interface (API) from which the receiving party can access the location of the vehicle.

FIG. **7** illustrates a flow diagram for an exemplary method **700** for receiving from a user a revocation of consent for monitoring the location of a vehicle associated with the user. At **710**, the method **700** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user initiates the telephone call. In another embodiment, the user receives the telephone call. At **720**, the method **700** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI). In other embodiments, the identifier is an identifier other than a telephone number as discussed above in reference to method **600**.

At **730**, the method **700** includes communicating to the user via an automated voice message transmitted to the communications device information indicating that consent to the monitoring of the location of the vehicle associated with the user is revocable via the communications device. At **740**, the method **700** includes receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle associated with the user.

In one embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, the revocation of consent is temporary, and the receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle includes receiving data indicating (a) a time at which consent to the monitoring of the location of the vehicle is revoked, (b) a time until which the consent to the monitoring of the location of the vehicle is revoked, or (c) an interval of time during which the consent to the monitoring of the location of the vehicle is revoked. Consent is revoked at the time indicated or at the beginning of the indicated interval of time. Consent is unrevoked at the indicated time until which the consent to the monitoring of the location of the vehicle is revoked or upon expiration of the indicated interval of time during which the consent to the monitoring of the location of the vehicle is revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "share" using the device **110**. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively. In one embodiment, words other than "hide" or "share" may be used to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively.

FIG. **8** illustrates an exemplary user interface **800** for use in conjunction with a system for monitoring of the location of the vehicle. The user interface **800** is operable by the requesting party or the receiving party to set up monitoring of the location of the vehicle, display information regarding monitoring of the location of the vehicle, and display location of the vehicle.

In the illustrated embodiment, the user interface **800** displays Start/End Monitoring buttons **810***a-g* operable by a user to end or start monitoring of the location of the vehicle. The user interface **800** further displays the Telephone Number corresponding to the communications device associated with a user associated with the vehicle. The user interface **800** further displays the Monitoring Term, which corresponds to the total amount of time (e.g., 2 hours) that the location of the associated vehicle will be monitored. The user interface **800** further displays the Monitoring Interval, which corresponds to how often within the Monitoring Term (e.g., every 15 minutes) the location of the vehicle is updated. In the illustrated embodiment, the user interface **800** displays the Location as latitude and longitude coordinates. In another embodiment, the user interface **800** displays the Location in a format

other than latitude and longitude coordinates. In one embodiment, a user may click on Location to display a map that includes a mark indicating the location of the vehicle on the map.

In one embodiment, an operator of a system for monitoring location of a vehicle or some other party who provides vehicle location monitoring services to a user charges fees to the user on a per-load basis or a per-time-monitored basis. A common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This is, at least in part, due to limitations of conventional systems for monitoring vehicle location. The systems and methods for monitoring location of a vehicle disclosed herein provide the provider of vehicle location monitoring services with the ability to charge for the services on a per-load basis or a per-time-monitored basis. For example, a user may operate the user interface **800** or any other means to interface with the system for monitoring location of vehicles to set a time to start or end monitoring of the location of five vehicles (e.g., Start/End Monitoring buttons **810***a-g*).

In one embodiment where the provider of vehicle location monitoring services provides its services on a per-load or a per-time-monitored basis at a set or negotiated rate per load per unit time, the system may keep track of the number of vehicles (i.e., five) whose location is monitored, as well as the total amount of time for which vehicles' location is monitored (i.e., total time×5 vehicles×rate). The operator may use the Monitoring Term to establish the total amount of time (e.g., 2 hours) or the Monitoring Interval to establish the frequency within the Monitoring Term (e.g., every 15 minutes) that the location of the vehicle or vehicles is monitored. With this information available to the operator's billing system, the operator can charge fees to the user on a per-load basis or a per-time-monitored basis.

In the illustrated embodiment, the user interface displays a Partner/Code. The Partner/Code field may display a code corresponding to a partner company or driver. For example, a carrier A may subcontract with another carrier NAT to move freight from location **1** to location **2**. The user interface displays the carrier NAT associated with the Telephone Number 555-555-5555.

The user interface **800** further displays a Reference Number. In one embodiment, the Reference Number field is a customizable field that carriers can use to identify a particular load, a particular vehicle, a particular order, etc. In one embodiment, the Reference Number appears in invoices and other documents to facilitate efficient system administration.

The user interface **800** further displays the Status of the vehicle. For example, the Status may indicate that the system is Monitoring the vehicle. In another example, the Status may display that the vehicle is Hidden to indicate that the user associated with the vehicle has temporarily revoked consent to monitoring of the vehicle's location. Other possible Status indicators include: (a) Ready to monitor, which indicates that the monitoring of the location of the vehicle is setup and the system is awaiting location information data, (b) Expired, which indicates that the Monitoring Term has expired, and (c) Denied, which indicates that the user denied consent to monitoring the location of the vehicle.

In one embodiment, the user interface **800** is used to add vehicles whose location is to be monitored. A user may use field **820** to enter the identifier corresponding to the communications device associated with the vehicle whose location is to be monitored. In one embodiment (not illustrated), the user interface **800** provides a pull-down menu from which the user may chose an identifier. The user may further enter the Monitoring Term in field **830**, the Monitoring Interval in field **840**, the Partner/Code in field **850** and the Reference Number in field **860**. In one embodiment (not illustrated), the user interface **800** provides each of these fields as pull-down menus.

In some cases, the requesting party may not know the identifier corresponding to the vehicle or the user may know the identifier but not have authorization to monitoring the location of the vehicle associated with the identifier. In one embodiment (not shown), the user may enter a Partner/Code that serves as verification that the user has obtained authorization from the partner to monitor location of the vehicle associated with the identifier. This feature may also serve to keep the user from learning the identifier in cases where the user associated with the vehicle, the partner, or some other party desires not to reveal the identifier to the requesting party.

In one embodiment, the user associated with the vehicle (e.g., driver) may enter the Partner/Code. For example, the user associated with the vehicle may be an independent driver who wishes for the location information of his vehicle to be monitored by a carrier so that the carrier may assign freight for the driver to haul. However, the carrier may not want every driver in the field to do this freely because of the potential costs associated with monitoring the location of a large number of vehicles. The carrier may require the driver to enter a Partner/Code obtained from the carrier that serves as verification that the driver has obtained authorization from the carrier for the location of the driver's vehicle to be monitored by the carrier.

Referring now to FIG. **9**, an application programming interface (API) **900** is illustrated providing access to a system **910** for monitoring location of a vehicle to a receiving party. The API **900** can be employed, for example, by a programmer **920** or a process **930** to gain access to processing performed by the system **910**. For example, a programmer **920** can write a program to access the system **910** (e.g., invoke its operation, obtain its operation, set up its operation, monitor location of a vehicle) where writing the program is facilitated by the presence of the API **900**. Rather than programmer **920** having to understand the internals of the system **910**, the programmer **920** merely has to learn the interface to the system **910**. This facilitates encapsulating the functionality of the system **910** while exposing that functionality.

Similarly, the API **900** can be employed to provide data values to the system **910** or retrieve data values from the system **910**. For example, a process **930** that processes location of a vehicle can provide an identifier to the system **910** via the API **900** by, for example, using a call provided in the API **900**. Thus, in one example of the API **900**, a set of application programming interfaces can be stored on a computer-readable medium. The interfaces can be employed by a programmer, computer component, logic, and so on, to gain access to a system **910** for monitoring location of a vehicle.

FIG. **10** illustrates a computer **1000** that includes a processor **1002**, a memory **1004**, and I/O Ports **1010** operably connected by a bus **1008**. In one example, the computer **1000** may include a validation logic **1030** configured to facilitate validation of a communications device. Thus, the validation logic **1030**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for identifying the communications device at least in part by obtaining an identifier associated with the communications device. In another example, the computer **1000** may include a notification logic **1040** configured to provide notification to the user associated with a vehicle. Thus, the notification logic **1040**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for communicating a signal including

data representing automated voice messages that provide notices or directs the user of the communications device to notices that include information indicating (a) that consenting to the monitoring of the vehicle will result in the location information of the vehicle or the communications device being disclosed, (b) that the user may revoke notice by operation of the communications device, and so on. In yet another example, the computer **1000** may include a correlation logic **1070** configured to correlate a vehicle to a communications device or the location information of a communications device to the location of a vehicle based at least in part on the communications device being associated with a user of the communications device who is associated with the vehicle. Thus, the correlation logic **1070**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for correlating a vehicle to a communications device based at least in part on the communications device being associated with the user who is associated with the vehicle, means for correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, or means for transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle. The validation logic **1030**, the notification logic **1040**, or the correlation logic **1070** may be permanently or removably attached to the computer **1000**.

The processor **1002** can be a variety of various processors including dual microprocessor and other multi-processor architectures. The memory **1004** can include volatile memory or non-volatile memory. The non-volatile memory can include, but is not limited to, ROM, PROM, EPROM, EEPROM, and the like. Volatile memory can include, for example, RAM, synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), and direct RAM bus RAM (DRRAM).

A disk **1006** may be operably connected to the computer **1000** via, for example, a communications interface (e.g., card, device) **1018** and an I/O Ports **1010**. The disk **1006** can include, but is not limited to, devices like a magnetic disk drive, a solid state disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, or a memory stick. Furthermore, the disk **1006** can include optical drives like a CD-ROM, a CD recordable drive (CD-R drive), a CD rewriteable drive (CD-RW drive), or a digital video ROM drive (DVD ROM). The memory **1004** can store processes **1014** or data **1016**, for example. The disk **1006** or memory **1004** can store an operating system that controls and allocates resources of the computer **1000**.

The bus **1008** can be a single internal bus interconnect architecture or other bus or mesh architectures. While a single bus is illustrated, it is to be appreciated that computer **1000** may communicate with various devices, logics, and peripherals using other busses that are not illustrated (e.g., PCIE, SATA, Infiniband, 1394, USB, Ethernet). The bus **1008** can be of a variety of types including, but not limited to, a memory bus or memory controller, a peripheral bus or external bus, a crossbar switch, or a local bus. The local bus can be of varieties including, but not limited to, an industrial standard architecture (ISA) bus, a microchannel architecture (MCA) bus, an extended ISA (EISA) bus, a peripheral component interconnect (PCI) bus, a universal serial (USB) bus, and a small computer systems interface (SCSI) bus.

The computer **1000** may interact with input/output devices via communications interface **1018** and I/O Ports **1010**. Input/output devices can include, but are not limited to, a keyboard, a microphone, a pointing and selection device, cameras, video cards, displays, disk **1006**, network devices **1020**, and the like. The I/O Ports **1010** can include but are not limited to, serial ports, parallel ports, and USB ports.

The computer **1000** can operate in a network environment and thus may be connected to network devices **1020** via the communications interface **1018**, or the I/O Ports **1010**. Through the network devices **1020**, the computer **1000** may interact with a network. Through the network, the computer **1000** may be logically connected to remote computers. The networks with which the computer **1000** may interact include, but are not limited to, a local area network (LAN), a wide area network (WAN), and other networks. The network devices **1020** can connect to LAN technologies including, but not limited to, fiber distributed data interface (FDDI), copper distributed data interface (CDDI), Ethernet (IEEE 802.3), token ring (IEEE 802.5), wireless computer communication (IEEE 802.11), Bluetooth (IEEE 802.15.1), Zigbee (IEEE 802.15.4) and the like. Similarly, the network devices **1020** can connect to WAN technologies including, but not limited to, point to point links, circuit switching networks like integrated services digital networks (ISDN), packet switching networks, LTE networks, GSM networks, GPRS networks, CDMA networks, and digital subscriber lines (DSL). While individual network types are described, it is to be appreciated that communications via, over, or through a network may include combinations and mixtures of communications.

DEFINITIONS

The following includes definitions of selected terms employed herein. The definitions include various examples, forms, or both of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Both singular and plural forms of terms may be within the definitions.

As used in this application, the term “computer component” refers to a computer-related entity, either hardware, firmware, software, a combination thereof, or software in execution. For example, a computer component can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and a computer. By way of illustration, both an application running on a server and the server can be computer components. One or more computer components can reside within a process or thread of execution and a computer component can be localized on one computer or distributed between two or more computers.

“Computer communication,” as used herein, refers to a communication between two or more computing devices (e.g., computer, personal digital assistant, cellular telephone) and can be, for example, a network transfer, a file transfer, an applet transfer, an email, a hypertext transfer protocol (HTTP) transfer, and so on. A computer communication can occur across, for example, a wireless system (e.g., IEEE 802.11, IEEE 802.15), an Ethernet system (e.g., IEEE 802.3), a token ring system (e.g., IEEE 802.5), a local area network (LAN), a wide area network (WAN), a point-to-point system, a circuit switching system, a packet switching system, combinations thereof, and so on.

“Computer-readable medium,” as used herein, refers to a medium that participates in directly or indirectly providing signals, instructions or data. A computer-readable medium may take forms, including, but not limited to, non-volatile

media, volatile media, and transmission media. Non-volatile media may include, for example, optical or magnetic disks, and so on. Volatile media may include, for example, optical or magnetic disks, dynamic memory and the like. Transmission media may include coaxial cables, copper wire, fiber optic cables, and the like. Transmission media can also take the form of electromagnetic radiation, like that generated during radio-wave and infra-red data communications, or take the form of one or more groups of signals. Common forms of a computer-readable medium include, but are not limited to, a floppy disk, a flexible disk, a hard disk, a magnetic tape, other magnetic media, a CD-ROM, other optical media, punch cards, paper tape, other physical media with patterns of holes, a RAM, a ROM, an EPROM, a FLASH-EPROM, or other memory chip or card, a memory stick, a carrier wave/pulse, and other media from which a computer, a processor or other electronic device can read. Signals used to propagate instructions or other software over a network, like the Internet, can be considered a "computer-readable medium."

"Data store," as used herein, refers to a physical or logical entity that can store data. A data store may be, for example, a database, a table, a file, a list, a queue, a heap, a memory, a register, and so on. A data store may reside in one logical or physical entity or may be distributed between two or more logical or physical entities.

A "logic," as used herein, includes but is not limited to hardware, firmware, software or combinations of each to perform a function(s) or an action(s), or to cause a function or action from another logic, method, or system. For example, based on a desired application or needs, a logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), a programmed logic device, a memory device containing instructions, or the like. A logic may include one or more gates, combinations of gates, or other circuit components. A logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

An "operable connection," or a connection by which entities are "operably connected," is one in which signals, physical communications, or logical communications may be sent or received. Typically, an operable connection includes a physical interface, an electrical interface, or a data interface, but it is to be noted that an operable connection may include differing combinations of these or other types of connections sufficient to allow operable control. For example, two entities can be operably connected by being able to communicate signals to each other directly or through one or more intermediate entities like a processor, operating system, a logic, software, or other entity. Logical or physical communication channels can be used to create an operable connection.

"Signal," as used herein, includes but is not limited to one or more electrical or optical signals, analog or digital signals, data, one or more computer or processor instructions, messages, a bit or bit stream, or other means that can be received, transmitted or detected.

"Software," as used herein, includes but is not limited to, one or more computer or processor instructions that can be read, interpreted, compiled, or executed and that cause a computer, processor, or other electronic device to perform functions, actions or behave in a desired manner. The instructions may be embodied in various forms like routines, algorithms, modules, methods, threads, or programs including separate applications or code from dynamically or statically linked libraries. Software may also be implemented in a variety of executable or loadable forms including, but not limited to, a stand-alone program, a function call (local or remote), a servelet, an applet, instructions stored in a memory, part of an operating system or other types of executable instructions. It will be appreciated by one of ordinary skill in the art that the form of software may depend, for example, on requirements of a desired application, the environment in which it runs, or the desires of a designer/programmer or the like. It will also be appreciated that computer-readable or executable instructions can be located in one logic or distributed between two or more communicating, co-operating, or parallel processing logics and thus can be loaded or executed in serial, parallel, massively parallel and other manners.

Suitable software for implementing the various components of the example systems and methods described herein may be produced using programming languages and tools like Java, Java Script, Java.NET, ASP.NET, VB.NET, Cocoa, Pascal, C#, C++, C, CGI, Perl, SQL, APIs, SDKs, assembly, firmware, microcode, or other languages and tools. Software, whether an entire system or a component of a system, may be embodied as an article of manufacture and maintained or provided as part of a computer-readable medium as defined previously. Another form of the software may include signals that transmit program code of the software to a recipient over a network or other communication medium. Thus, in one example, a computer-readable medium has a form of signals that represent the software/firmware as it is downloaded from a web server to a user. In another example, the computer-readable medium has a form of the software/firmware as it is maintained on the web server. Other forms may also be used.

"User," as used herein, includes but is not limited to one or more persons, software, computers or other devices, or combinations of these.

To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the detailed description or claims (e.g., A or B) it is intended to mean "A or B or both". When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995).

While example systems, methods, and so on, have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on, described herein. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention is not limited to the specific details, and illustrative examples shown or described. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims. Furthermore, the preceding description is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.

What is claimed is:

1. A computer implemented method for indicating location of freight carried by a vehicle, the method comprising:

correlating the freight to a communications device;

receiving a first signal including data representing a request for information regarding the location of the freight;

transmitting to the communications device a second signal including data that prompts an automated message to be communicated to a user of the communications device, the automated message representing a notice communicating to the user of the communications device that the location information of the communication device will be obtained;

receiving from the communications device a third signal including data indicative of consent from the user to the obtaining of the location information of the communications device;

transmitting a fourth signal to a location information provider, the fourth signal including data representing a request for location information of the communications device, wherein the location information provider corresponds to a party or device other than the communications device and the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider;

receiving a fifth signal from the location information provider, the fifth signal including data representing the location information of the communications device;

correlating the location information of the communications device to the location of the freight based at least in part on the correlation between the freight and the communications device; and

transmitting a sixth electronic signal including data representing the location of the freight.

2. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

3. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including at least one of:

advance forward link trilateration (AFLT),

observed time difference (OTD),

Cell-ID (CID), and

a range of locations corresponding to a transmission range of a single radio tower.

4. The method of claim **1**, wherein the correlating the freight to the communications device includes correlating the freight to a driver of the vehicle who is also associated with the communications device.

5. The method of claim **1**, wherein the fourth electronic signal includes data representing a telephone number associated with the communications device.

6. The method of claim **1**, wherein the transmitting the sixth electronic signal including data representing the location of the freight includes exposing an application programming interface (API) from which the requesting party can access the location of the freight.

7. The method of claim **1**, wherein the requesting party corresponds to one of:

a freight service provider wherein the location of the freight is transmitted to the freight service provider,

a party that provides location information services to the freight service provider, and

the driver of the vehicle requesting that the location of the freight be transmitted to a freight service provider for the freight service provider to have access to location of the freight carried by the vehicle.

8. A system for obtaining location of freight carried by a vehicle, the system comprising:

a communications interface configured to communicate electronic signals including:

a first electronic signal including data representing a request for the location of the freight, the first electronic signal received from a requesting party, a second electronic signal including data representing a request for location information of a communications device not attached to the freight or the vehicle,

a third electronic signal including data representing the location information of the communications device, wherein the third electronic signal is received from a location information provider corresponding to a party or device other than the communications device and corresponding to one or more of:

a wireless service provider providing wireless service to the communications device,

a third party obtaining the location information from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information, but is other than the wireless service provider or the third party that obtains the location information from the wireless service provider; and

a fourth electronic signal including data representing the location of the freight;

a correlation logic configured to correlate the location information of the communications device to the location of the freight;

a validation logic configured to identify the communications device at least in part by obtaining an identifier associated with the communications device; and

a notification logic configured to generate a fifth electronic signal including data that causes the communications device to generate a notice indicating to a user of the communications device that the location information of the communications device will be disclosed,

wherein the communications interface is further configured to:

transmit the fifth electronic signal to the communications device, and

receive from the communications device a sixth signal including data indicative of consent from the user to the obtaining of the location information of the communications device.

9. The system of claim **8**, wherein the location information of the communications device is originally obtained using a method that does not require a global position system (GPS) satellite receiver to form part of the communications device.

10. The system of claim **8**, wherein the location information of the communications device is originally obtained through techniques including at least one:

triangulation between radio towers,

obtaining a range of locations corresponding to a transmission range of a single radio tower,

advance forward link trilateration (AFLT),

observed time difference (OTD), and

Cell-ID (CID).

11. The system of claim **8**, wherein the communications interface is configured to transmit the fourth electronic signal to one or more of:

a freight service provider wherein the location of the freight carried by the vehicle is transmitted to the freight service provider,

a party that provides location information services to the freight service provider, and

the driver of the vehicle requesting that the location of the vehicle be transmitted to a freight service provider for the freight service provider to have access to location information of freight carried by the vehicle.

12. The system of claim **8**, wherein the correlation logic is configured to correlate the location information of the communications device to the location of the freight carried by the vehicle based at least in part on the communications device being associated with a driver of the vehicle.

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Adelson

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(45) **Date of Patent: *Jul. 14, 2015**

(54) **SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE**

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(22) Filed: **Mar. 18, 2015**

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(58) **Field of Classification Search**
CPC G06Q 10/0833; G08G 1/20; G08G 1/205
USPC 340/988–994; 701/1, 2, 32.3, 454, 467, 701/482, 485; 348/116
See application file for complete search history.

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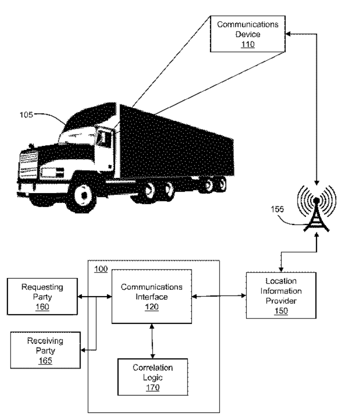
(74) *Attorney, Agent, or Firm* — Renner, Otto, Boisselle & Sklar, LLP.

(57) **ABSTRACT**

Monitoring location of a vehicle or freight carried by the vehicle includes receiving a request for information regarding the location of the vehicle or the freight carried by the vehicle, correlating the vehicle or the freight carried by the vehicle to a communications device, transmitting a request for location information of the communications device to a location information provider, receiving an indication that a user of the communications device consented to transmission of location information, receiving the location information of the communications device from the location information provider, correlating the location information of the communications device to the location of the vehicle or the freight carried by the vehicle based on the correlation of the vehicle or the freight carried by the vehicle to the communications device, and transmitting the location of the vehicle or the freight carried by the vehicle.

28 Claims, 10 Drawing Sheets



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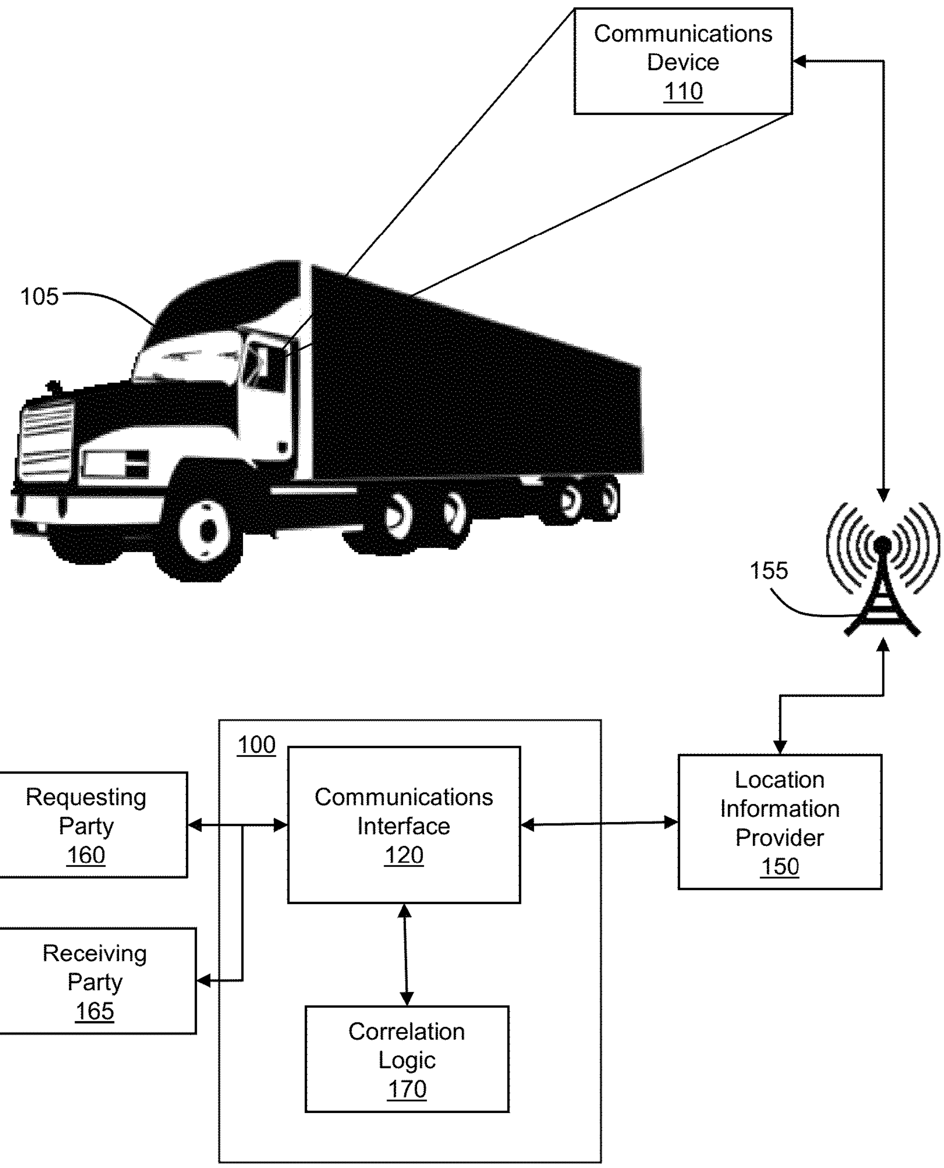
Communications
Device
110
105
155
100
Requesting
Party
160
Receiving
Party
165
Communications
Interface
120
Correlation
Logic
170
Location
Information
Provider
150

Figure 1

200

220 230

	Active Driver 210a	**Active Device 110a**	**Backup Driver 210b**	**Backup Device 110b**	**Total Capacity ft³ / lbs.**	**Available Capacity ft³ / lbs.**
[redacted]						
105b	Gary Fisher	(546) 542-1235			3,931 42,010	2,531 22,010
[redacted]						
105d	Colnago Cinelli	(563) 543-5635	Ross Raleigh	(243) 546-5435	2,878 Ref 36,280	2,878 Ref. 36,280
[redacted]						
105f	Emilio Bozzi	(507) 543-5475	Murray Schwinn	(548) 243-5433	3,268 41,700	0 0
[redacted]						

Figure 2

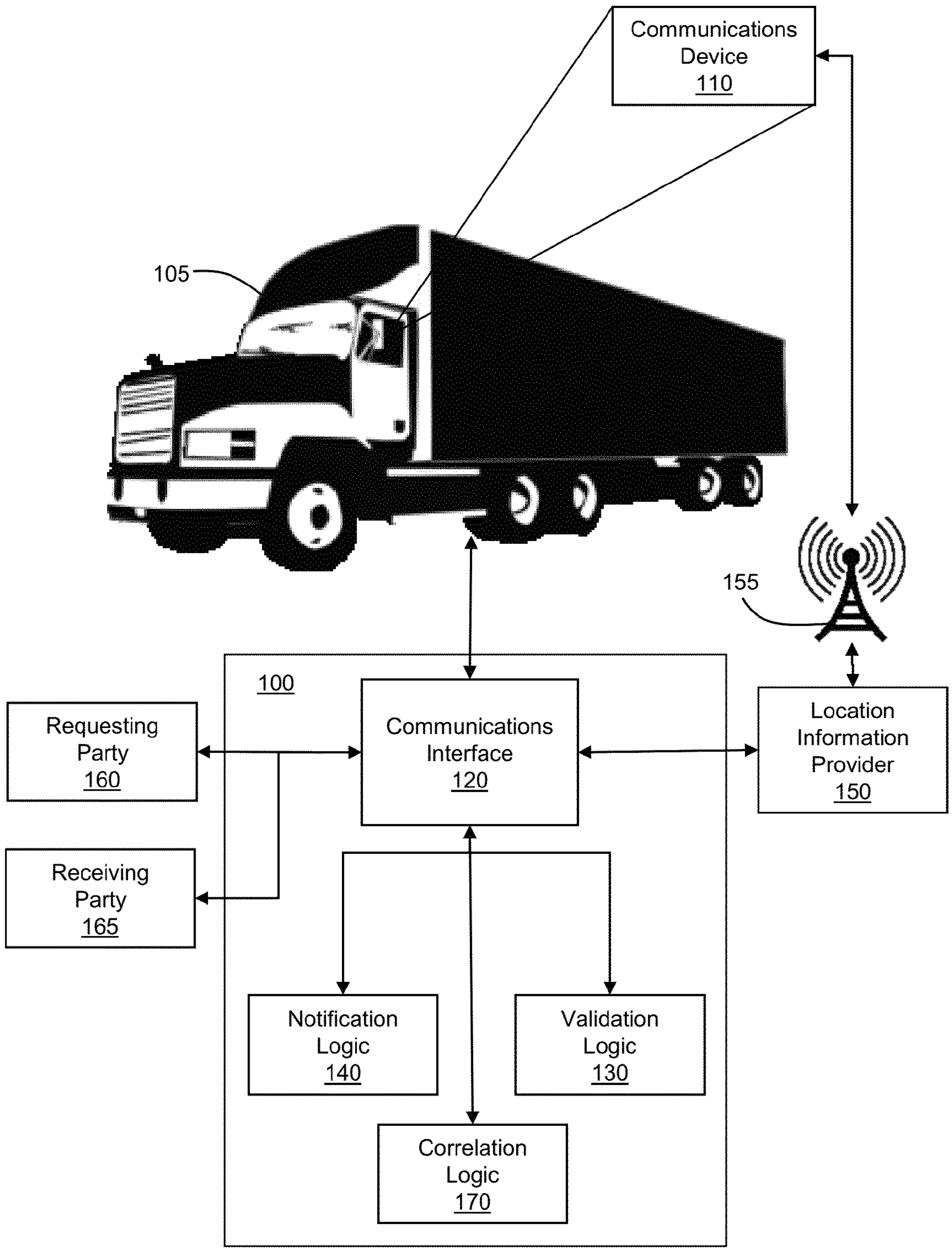
Communications
Device
110
105
155
100
Requesting
Party
160
Communications
Interface
120
Location
Information
Provider
150
Receiving
Party
165
Notification
Logic
140
Validation
Logic
130
Correlation
Logic
170

Figure 3

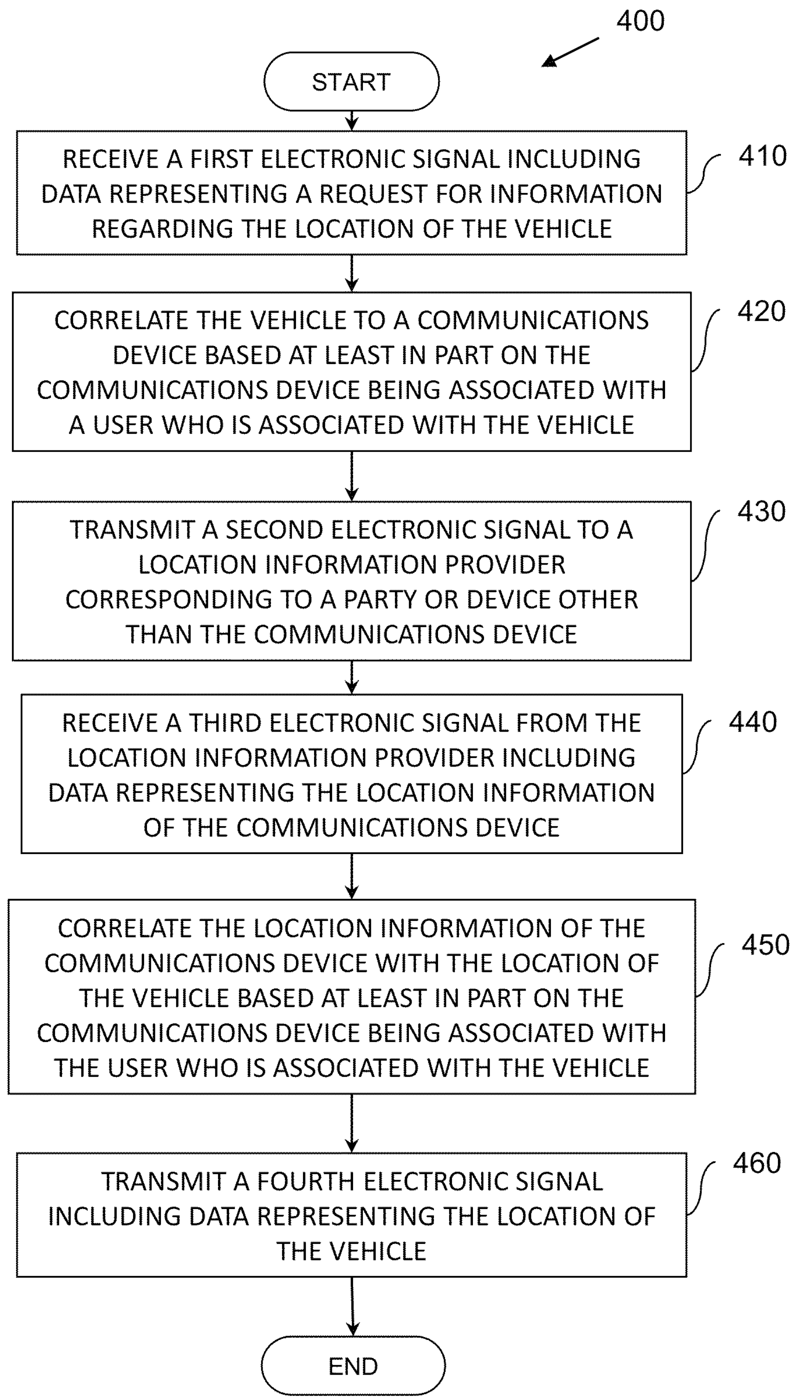
400
START
RECEIVE A FIRST ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING A REQUEST FOR INFORMATION REGARDING THE LOCATION OF THE VEHICLE
410
CORRELATE THE VEHICLE TO A COMMUNICATIONS DEVICE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH A USER WHO IS ASSOCIATED WITH THE VEHICLE
420
TRANSMIT A SECOND ELECTRONIC SIGNAL TO A LOCATION INFORMATION PROVIDER CORRESPONDING TO A PARTY OR DEVICE OTHER THAN THE COMMUNICATIONS DEVICE
430
RECEIVE A THIRD ELECTRONIC SIGNAL FROM THE LOCATION INFORMATION PROVIDER INCLUDING DATA REPRESENTING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
440
CORRELATE THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE WITH THE LOCATION OF THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER WHO IS ASSOCIATED WITH THE VEHICLE
450
TRANSMIT A FOURTH ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING THE LOCATION OF THE VEHICLE
460
END

Figure 4

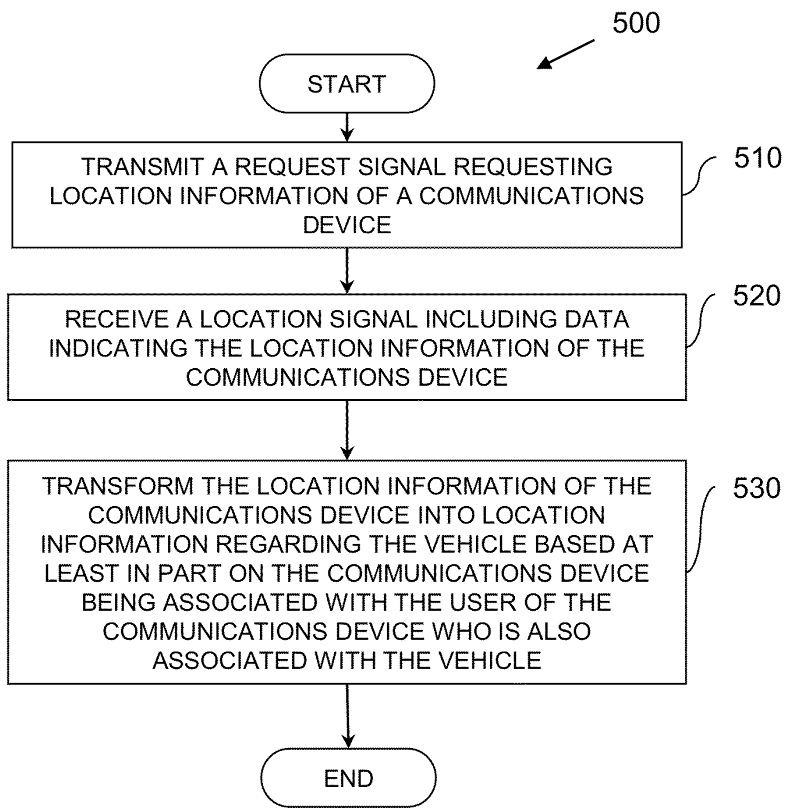
500
START
TRANSMIT A REQUEST SIGNAL REQUESTING LOCATION INFORMATION OF A COMMUNICATIONS DEVICE
510
RECEIVE A LOCATION SIGNAL INCLUDING DATA INDICATING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
520
TRANSFORM THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE INTO LOCATION INFORMATION REGARDING THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER OF THE COMMUNICATIONS DEVICE WHO IS ALSO ASSOCIATED WITH THE VEHICLE
530
END

Figure 5

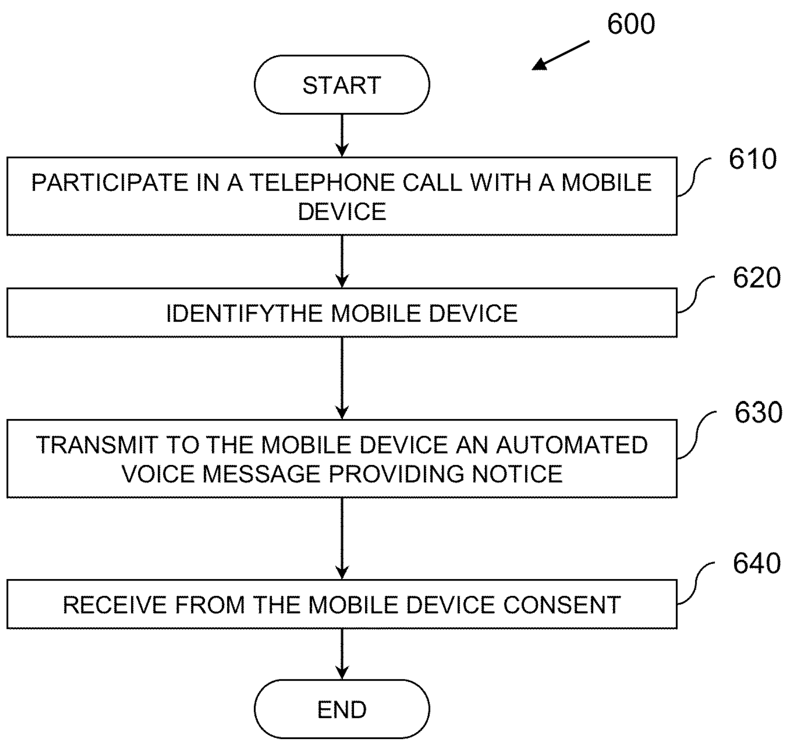
600
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
610
IDENTIFYTHE MOBILE DEVICE
620
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE PROVIDING NOTICE
630
RECEIVE FROM THE MOBILE DEVICE CONSENT
640
END

Figure 6

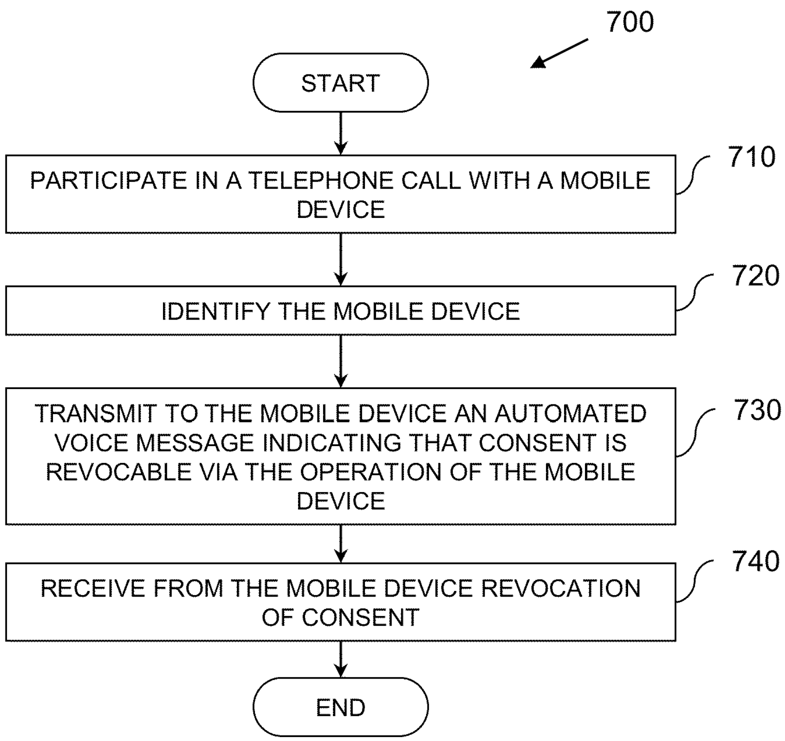
700
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
710
IDENTIFY THE MOBILE DEVICE
720
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE INDICATING THAT CONSENT IS REVOCABLE VIA THE OPERATION OF THE MOBILE DEVICE
730
RECEIVE FROM THE MOBILE DEVICE REVOCATION OF CONSENT
740
END

Figure 7

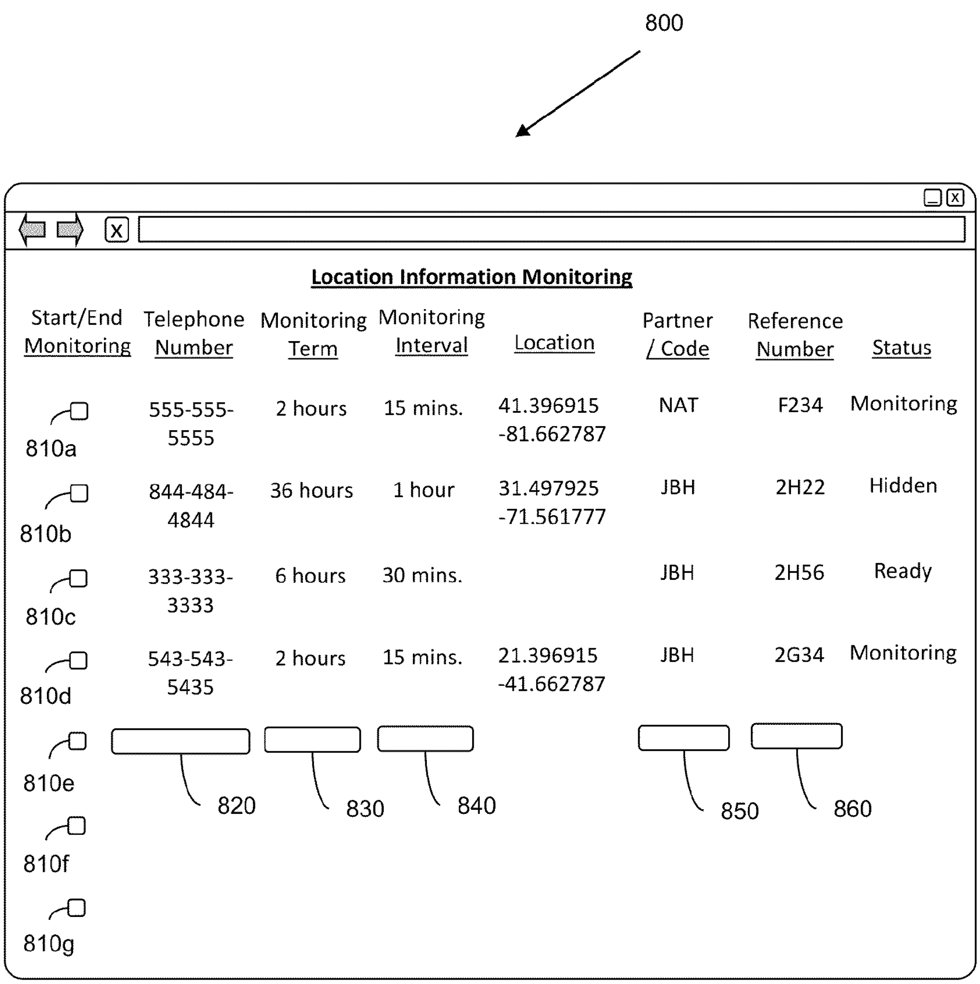
800
Location Information Monitoring
Start/End Monitoring
Telephone Number
Monitoring Term
Monitoring Interval
Location
Partner / Code
Reference Number
Status
810a
555-555-5555
2 hours
15 mins.
41.396915 -81.662787
NAT
F234
Monitoring
810b
844-484-4844
36 hours
1 hour
31.497925 -71.561777
JBH
2H22
Hidden
810c
333-333-3333
6 hours
30 mins.
JBH
2H56
Ready
810d
543-543-5435
2 hours
15 mins.
21.396915 -41.662787
JBH
2G34
Monitoring
810e
810f
810g
820
830
840
850
860

Figure 8

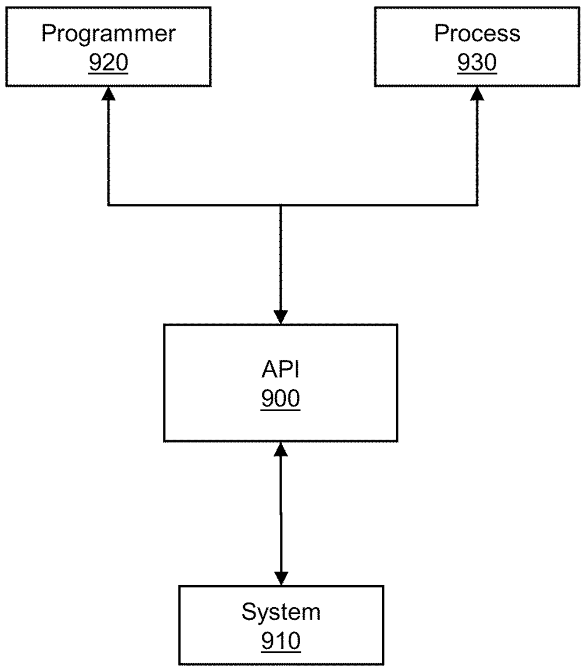

Figure 9

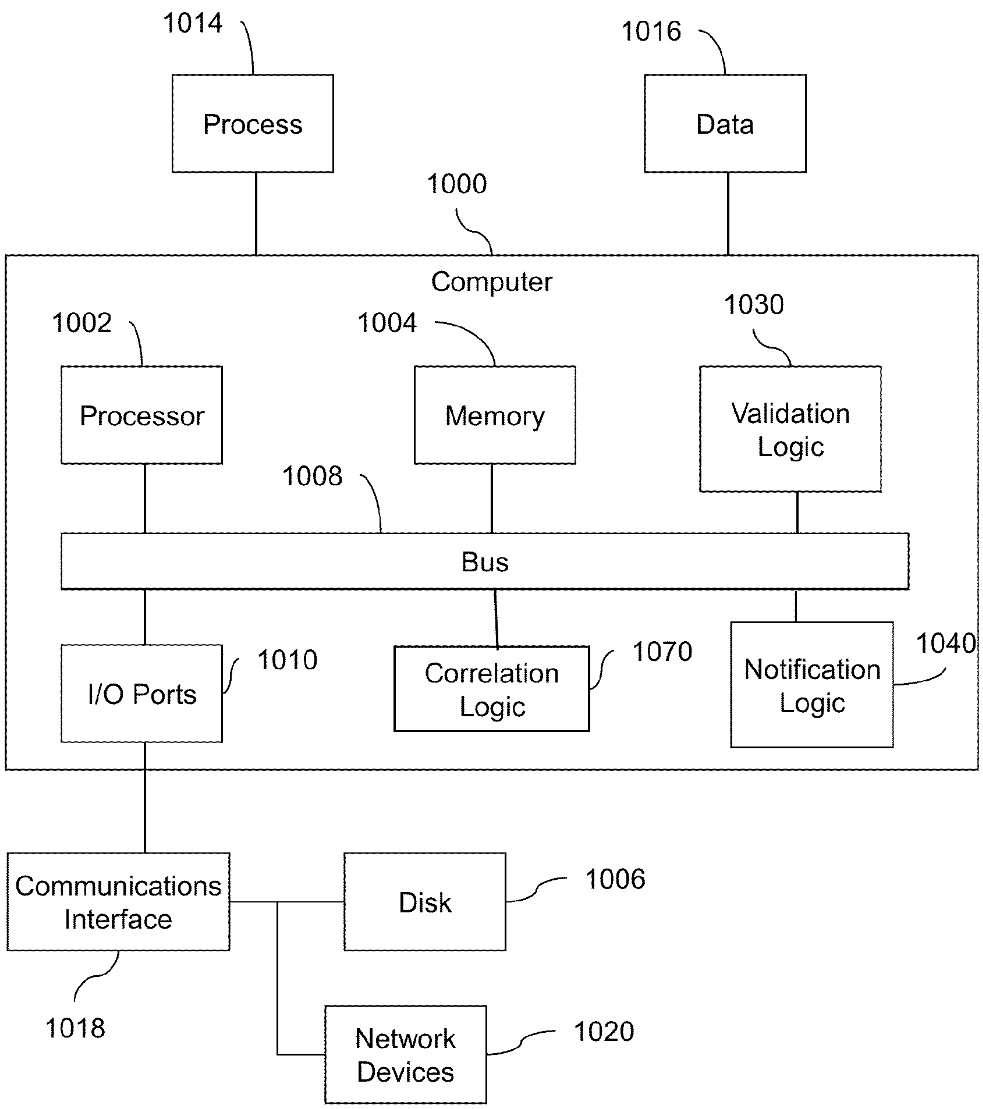
1014
Process
1016
Data
1000
Computer
1002
Processor
1004
Memory
1030
Validation Logic
1008
Bus
I/O Ports
1010
Correlation Logic
1070
Notification Logic
1040
Communications Interface
1018
Disk
1006
Network Devices
1020

Figure 10

SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE

TECHNICAL FIELD

The present disclosure relates to systems and methods for monitoring location.

BACKGROUND

Location information is becoming more important and prevalent.

In one example application of the use of location information, carriers, shippers, freight hauling services providers, third-party logistics service providers and courier services providers as well as other logistics and freight service providers (freight hauling) benefit from monitoring the location of vehicles in their fleets or under contract. Monitoring the location of vehicles helps improve efficiency because it allows for real-time or near real-time decision making when matching loads with vehicles. For example, by monitoring the location of fleet vehicles, a dispatcher may better understand which vehicle is the most appropriate (e.g., geographically closest, appropriate size, etc.) to send to a location for a load pickup. Conventional systems for monitoring vehicle location have relied on global positioning systems (GPS) to provide the vehicle's location. These systems require a GPS receiver to be installed in each vehicle. Moreover, some of these systems require the installation of additional dedicated equipment in each vehicle.

In addition, at least in part due to limitations of conventional systems for monitoring vehicle location, a common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This practice may represent a substantial cost to a user or organization that, for example, may wish to monitor a relatively small number of vehicles or a relatively small number of loads for a relatively short amount of time.

SUMMARY

Alternative methods for monitoring location of vehicles include radiolocation techniques including triangulation or multilateration methods that are capable of locating devices in a network. These methods involve the measurement of radio signals between a device and radio towers in the network. The technology, originally intended by telecommunication companies to approximate the location of a mobile phone in case of emergencies, provides the location of a device in the network.

The use of all of these location information technologies also raises privacy issues. A user's privacy may be at risk if location information is misused or disclosed without the authorization or knowledge of the user. To address these privacy concerns, various governmental and business organizations have developed rules and guidelines to protect user privacy. For example, the International Association for the Wireless Telecommunications Industry (CTIA) has developed Best Practices and Guidelines for Location-Based Services (the "CTIA Guidelines"), which are hereby incorporated by reference.

The Guidelines provide a framework based on two principles: user notice and consent. Users must receive "meaningful notice about how location information will be used, disclosed and protected so that users can make informed decisions . . . and . . . have control over their location information." Users must also "consent to the use or disclosure of location information" and "have the right to revoke consent . . . at any time."

Although, electronic methods have been developed that make use of web browsers and SMS texting capabilities of mobile devices to provide notification and consent, some of these systems have proved inconvenient and may require advanced mobile devices or extensive user training.

A computer implemented method for monitoring location of a vehicle includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle, correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle, and transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes receiving a third electronic signal from the location information provider. The third electronic signal includes data representing the location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, and transmitting a fourth electronic signal including data representing the location of the vehicle.

Another computer implemented method for monitoring location of a vehicle includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device and the communications device is associated with a user of the communications device who is associated with the vehicle. The computer implemented method for monitoring location of a vehicle further includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device and the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. The computer implemented method for monitoring location of a vehicle further includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

A system for monitoring location of a vehicle includes a communications interface configured to communicate electronic signals including: a first electronic signal including data representing a request for the location of the vehicle, the first electronic signal received from a requesting party, a second electronic signal including data representing a request for location information of a communications device, wherein the second electronic signal is transmitted to a location information provider corresponding to a party or device other than the communications device, wherein the communications device is associated with a user of the communications device who is associated with the vehicle, a third electronic signal including data representing the location information of the communications device, wherein the third electronic signal is received from the location information provider corresponding to the party or device other than the

communications device, and a fourth electronic signal including data representing the location of the vehicle, the fourth electronic signal transmitted to a receiving party. The system for monitoring location of a vehicle further includes a correlation logic configured to correlate the location information of the communications device to the location of the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various example systems, methods, and so on, that illustrate various example embodiments of aspects of the invention. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

FIG. **1** illustrates an exemplary system for monitoring the location of a vehicle.

FIG. **2** illustrates a simplified exemplary chart illustrating how a correlation logic may correlate a vehicle to a communications device or the location of the vehicle to the location information of the communications device.

FIG. **3** illustrates the exemplary system for monitoring the location of a vehicle with additional details.

FIG. **4** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **6** illustrates a flow diagram for an exemplary method for receiving consent from a user to monitoring the location of a vehicle associated with the user.

FIG. **7** illustrates a flow diagram for an exemplary method for receiving from a user a revocation of consent to monitoring the location of a vehicle associated with the user.

FIG. **8** illustrates an exemplary user interface for use in conjunction with a system for monitoring the location of a vehicle.

FIG. **9** illustrates an application programming interface (API) providing access to a system for monitoring the location of a vehicle.

FIG. **10** illustrates a computer where systems or methods for monitoring the location of a vehicle may be implemented.

DETAILED DESCRIPTION

Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

In the present disclosure, embodiments are described in the context of location of freight hauling vehicles. It will be appreciated, however, that the exemplary context of freight hauling vehicles is not the only operational environment in which aspects of the disclosed systems and methods may be used. Therefore, the techniques described in this disclosure may be applied to many types of apparatus, vehicles or devices whose location information may be of interest.

FIG. **1** illustrates an exemplary system **100** for monitoring the location of a vehicle **105**, which has a communication device **110** within the vehicle **105**. The system **100** includes a communications interface **120** that communicates with devices external to the system **100** via electronic signals. For example, the communications logic **120** is configured to communicate with a location information provider **150**, a requesting party **160**, and a receiving party **165**.

The location information provider **150** corresponds to a party or device other than the vehicle **105** and the device **110**. The location information provider **150** has access to location of the vehicle **105** or the device **110**. In one embodiment, the location information provider **150** is a wireless service provider that provides wireless service in a network **155**. In another embodiment, the location information provider **150** is a third party or device that receives the location information of the device **110** from the wireless service provider or from some other party or device. In yet another embodiment, the location information provider **150** is a party other than a wireless service provider or a third party. For example, the party seeking to monitor the location of the vehicle **105**, the requesting party **160**, may have access to the location information of the device **110**. In that case, the requesting party **160** may also be the location information provider **150**. In another example, the party operating the system **100** may have access to the location information of the device **110**.

The requesting party **160** corresponds to a party or device interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. The receiving party **165** corresponds to a party or device who receives the location of the vehicle **105** from the system **100** to monitor the location of the vehicle **105**. In an example involving freight hauling services providers or freight carriers, a carrier who is interested in monitoring the location of its own vehicles, vehicles under contract, or other vehicles requests the ability to monitor the location of the vehicle **105** for its own consumption. In this case, the carrier is both the requesting party **160** and the receiving party **165**. In another example, the requesting party **160** may be a driver interested in sharing the location of his/her vehicle **105** with a carrier to allow the carrier to monitor the location of the vehicle **105**. In this case, the driver is the requesting party **160** and the carrier is the receiving party **165**. In one embodiment, multiple parties or devices may be interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. In that case, the communications

interface **120** is configured to communicate with multiple requesting parties and/or multiple receiving parties.

The system **100** further includes a correlation logic **170** that correlates the vehicle **105** and the device **110**. In one embodiment, the correlation logic **170** correlates the vehicle **105** and the device **110** based at least in part on the vehicle **105** being associated with at least one user who is also associated with the device **110**. For example, the user may be associated with the vehicle **105** because the user is the designated driver of the vehicle **105** and the user may be associated with the communications device **110** because the user is under contract with a wireless service provider for the provider to provide wireless service to the communications device **110**. In another example, the user is associated with the vehicle **105**, with the device **110**, or with both in a database or in the correlation logic **170**. In another embodiment, the vehicle **105** is directly associated with the communications device **110** without a user being associated with the vehicle **105** or with the device **110**.

In an example of the operation of the system **100**, the requesting party **160** transmits and the communications interface **120** receives data representing a request from the requesting party **160** for the ability to monitor the location of the vehicle **105**. In response to the request from the requesting party **160**, the correlation logic **170** correlates the vehicle **105** to the device **110**. The communications interface **120** transmits to the location information provider **150** data representing one or more requests for location information of the device **110**. In response to a request for location information of the device **110**, the location information provider **150** transmits and the communications interface **120** receives data representing the location information of the device **110**. The correlation logic **170** correlates the location information of the device **110** to the location of the vehicle **105**.

With the location of the vehicle **105** on hand, the communication interface **120** can transmit data representing the location of the vehicle **105** to the receiving party **165** through computer communication. The location of the vehicle **105** may then be displayed in a user interface (not shown). In another embodiment, the communications interface **120** is configured to communicate the location to the receiving party **165** by exposing an application programming interface (API) through which the receiving party **165** can access the location of the vehicle **105**. The receiving party **165** can make use of the API to make the information available to its enterprise software (e.g., SAP, Oracle, etc.) for example.

FIG. **2** illustrates a simplified exemplary chart **200** illustrating how the correlation logic **170** may correlate the vehicle **105** to the device **110** or the location of the vehicle **105** to the location information of the device **110**. In the illustrated embodiment, for each vehicle **105***a-g* registered in the system **100**, the correlation logic **170** has data fields corresponding to each vehicle **105***a-g*. The data fields include information regarding the vehicles **105***a-g*. Potential information that may be included in the data fields include one or more drivers **210***a-b* associated with each of the vehicles **105***a-g* and one or more devices **110***a-b* associated with each of the drivers **210***a-b*, respectively. The drivers **210***a-b* are identified by name while the devices **110***a-b* are identified by an identifier, which in this case corresponds to a telephone number associated with the respective device **110***a-b*.

In other embodiments, the identifier corresponds to a number or some other identifying information associated with the device **110** other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

Additional information that may be included in the data fields include the capacity of a vehicle **105***a-g* (e.g., total volumetric and weight capacity **220**, available volumetric and weight capacity **230**, etc.), whether the container is refrigerated Ref., and so on.

In the illustrated embodiment, the vehicle **105***a* is associated with an active driver **210***a* named Bianchi Campagnolo who is associated with an active device **110***a* identified by an identifier corresponding to the telephone number (143) 846-5405. The vehicle **105***a* may also be associated with a backup driver named Bob Haro who is associated with a backup device **110***b* identified by an identifier corresponding to the telephone number (443) 240-5465. The correlation logic **170** correlates the vehicle **105** with the active driver **210***a* unless the correlation logic **170** is instructed to instead use the backup driver **210***b*. In that case, the active driver **210***a* and the backup driver **210***b* may switch, with the name listed under backup driver **210***b* appearing under active driver **210***a* and viceversa. Similarly, the correlation logic **170** correlates the vehicle **105** with the active device **110***a* unless the correlation logic **170** is instructed to instead use the backup device **110***b*. In that case, the active device **110***a* and the backup device **110***b* may switch, with the identifier listed under backup device **110***b* appearing under active device **110***a* and viceversa. In this way, the correlation logic **170** can transform the location information of the communications device **110** into information regarding the location of the vehicle **105** by correlating the location information of the communications device **110** to the location of the vehicle **105** based at least in part on the communications device **110** being associated with the user who is associated with the vehicle **105**. In one embodiment, the correlation logic **170** correlates the vehicle **105** with the active driver **210***a* and the backup driver **210***b*.

In the illustrated embodiment, the vehicle **105***a* has a total capacity of 4,013 pounds and 42,660 cubic feet of which 4,013 pounds and 42,660 cubic feet are currently available. The vehicle **105***c* has a total capacity of 2,878 pounds and 36,280 cubic feet. The capacity of the vehicle **105***c* is refrigerated capacity. However, none of that capacity is currently available (e.g., the container associated with the vehicle **105***c* is full) since the available capacity is indicated as 0 pounds and 0 cubic feet.

FIG. **3** illustrates the exemplary system **100** for monitoring the location of a vehicle **105** with additional details.

As described above, the system **100** receives the location information of the device **110** from a location information provider **150**, which is a party or device other than the device **110**. The location information provider **150** may be a wireless service provider or a party or device that receives the location information from a wireless service provider. Examples of wireless service providers in the United States include Verizon Wireless, AT&T Mobility, Sprint Nextel, T-Mobile, etc. These wireless service providers have technologies deployed that allow them to approximate the location of devices in their network. Some of these technologies were developed and deployed in compliance with E911, a government mandate requiring the wireless service providers to provide the approximate location of a mobile device in case of an emergency.

Location of devices in a cellular network may be described as involving two general positioning techniques: 1) techniques that require the device to incorporate a global posi-

tioning system (GPS) receiver, and 2) techniques that use some form of radiolocation from the device's network and do not require the device to incorporate a GPS receiver.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a radiolocation technique where the approximated location of the device **110** corresponds to a range of locations corresponding to a transmission range of a single radio tower **155**. In an example of this technology, each radio tower is assigned a unique identification number, a Cell-ID. The Cell-ID is received by all mobile devices in the coverage area of the radio tower **155**, thus the position of the device **110** in the coverage area of the radio tower **155** is derived from the coordinates of the radio tower **155**. Additional techniques, such as measuring signal strength of the device **110** could be used to increase the accuracy of the location information. Accuracy can be further enhanced by including a measurement of Timing Advance (TA) in GSM/GPRS networks or Round Trip Time (RTT) in UMTS networks. TA and RTT use time offset information sent from the radio tower **155** to adjust the communications device's relative transmit time to correctly align the time at which the communications device's signal arrives at the radio tower **155**. These measurements can be used to determine the distance from the communications device to the radio tower **155**, further improving accuracy.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part using triangulation between multiple radio towers such as tower **155**. The location of the device **110** may be determined by using one or a combination of several techniques including the following:

Angle of Arrival (AOA)—This technique requires at least two radio towers and locates the device **110** at the point where the lines along the angles from each tower intersect.

Time Difference of Arrival (TDOA)—This technique also requires at least two radio towers and determines the time difference between the time of arrival of a signal from the device **110** to the first tower **155**, to a second tower, and so on.

Advanced Forward Link Trilateration (AFLT)—In this technique the communications device measures signals from nearby towers such as radio tower **155**, which are then used to triangulate an approximate location of the device **110**.

Enhanced-observed time difference (E-OTD)—This technique takes data received from the nearby towers such as radio tower **155** to measure the difference in time it takes for the data to reach the device **110**. The time difference is used to calculate where the device **110** is in relation to the radio towers.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique not requiring a GPS satellite receiver to form part of the device **110**. In another embodiment the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a hybrid method including a technique requiring a GPS satellite receiver to form part of the device **110** and a technique not requiring a GPS satellite receiver to form part of the device **110**. In yet another embodiment, the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique requiring a GPS satellite receiver to form part of the device **110**.

However, since the system **100** obtains the location information from the location information provider **150** and not from the device **110**, the system **100** can be operated to monitor the location of devices incorporating a GPS satellite receiver as well as devices not incorporating a GPS satellite receiver. Thus, the system **100** does not rely on any particular positioning technology for obtaining the location of the vehicle **105**.

In continued reference to FIG. **3**, the system **100** provides user notification and receives user consent to the monitoring the location of the vehicle **105**. In this embodiment, the communications interface **120** is further configured for communication with the device **110**. In one embodiment, the communication interface **120** is associated with a toll free number such as a 1-800 number. The driver of the vehicle **105** may initiate a telephone call by dialing the toll free number. In another embodiment, the communications interface is associated with a number other than a toll free number. In yet another embodiment, the communications interface **120** is configured to initiate the telephone call.

In one embodiment, the system **100** further includes a validation logic **130** that is configured to identify the device **110** at least in part by obtaining the identifier associated with the device **110**. Obtaining the identifier associated with the device **110** ensures that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) is notified that location of the vehicle **105** will be monitored and that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) consents to the monitoring of the location. In one embodiment, the identifier is a telephone number associated with the device **110**. In one embodiment, where the communications interface **120** is associated with a toll free number as discussed above, the validation logic **130** is configured to identify the device **110** at least in part by obtaining the telephone number associated with the device **110** via automatic number identification (ANI). As discussed above in reference to FIG. **2**, in other embodiments, the identifier may be an identifier other than a telephone number.

The system **100** further includes a notification logic **140** that is configured to communicate a signal including data representing an automated voice message. In one embodiment, the automated voice message provides a notice that includes information indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. In another embodiment, the automated voice message provides a location (web address, etc.) where the notice may be found indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. For example, the automated voice message may indicate that the notice may be found at a web address and provide the web address.

The communications interface **120** is configured to transmit the automated voice message to the device **110**. The communications interface **120** is further configured to receive from the device **110** data indicating the user consent to monitoring of the location of the vehicle **105**.

In one embodiment, the automated voice message communicates that user's consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate your consent to revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive

data indicating that an action was performed on the device **110**, which indicates the user's consent (e.g., the user pressed 1).

In another embodiment, the automated voice message communicates that the user's consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your consent to revealing your location, please say 'yes.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's consent (e.g., the user said "yes").

In one embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** and receives the location information of the communications device **110**. The request for the location information of the device **110** includes the identifier associated with the device **110**.

In the illustrated embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** to a location information provider **150** and receives the location information of the communications device **110** from the location information provider **150**.

In one embodiment, the notification logic **140** is further configured to communicate a signal including data representing a second automated voice message indicating that consent to the monitoring of the location of the vehicle **105** is revocable via the device **110**. In this embodiment, the communications interface **120** is configured to communicate to the device **110** the second automated voice message and to receive confirmation of consent or revocation of consent to the monitoring of the location of the vehicle **105** from the device **110**.

In one embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate that you wish to revoke consent to revealing your location, please press 1"). In this embodiment, the communications interface **120** is configured to receive data indicating that an action was performed on the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user pressed 1).

In another embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your confirmation of consent to revealing your location, please say 'confirmed.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user said "confirmed").

In one embodiment, the user is given the option to temporarily revoke consent to the disclosure of location information. For example, a driver may wish to make available his location to a carrier during certain hours during the work week, but may not want the carrier to be able to obtain the driver's location during the weekend. The driver may operate the device **110** to indicate a date and time when the driver wishes for the monitoring of the location of the vehicle **105** to end or resume. Or the driver may operate the device **110** to indicate an interval of time (e.g., 2 hours) during which the driver wishes to hide the location of the vehicle **105**. In this embodiment, the communications interface **120** is configured to receive data indicating a time until which consent to the monitoring of the location of the vehicle **105** is granted or revoked, or an interval of time during which consent to the monitoring of the location of the vehicle **105** is granted or revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "share" using the device **110**. In this embodiment, the communications interface **120** is configured to receive the text message as sent by the device **110**, which indicates the user's confirmation or revocation of consent. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle **105**, respectively. In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent.

In one embodiment, when the location of the vehicle **105** is being disclosed, the notification logic **140** is further configured to periodically generate and the communications interface **120** is further configured to periodically communicate a reminder notification message indicating that the location of the vehicle **105** is currently being disclosed. In one embodiment, the system **100** reminds the user every 30 days that the location of the vehicle **105** is currently being disclosed. In another embodiment, the system **100** reminds the user more or less often than every 30 days that the location of the vehicle **105** is currently being disclosed.

In one embodiment, the communications interface **120** reminds the user in an automated voice message that the location of the vehicle **105** is currently being disclosed. In another embodiment, the communications interface **120** reminds the user in an SMS message that the location of the vehicle **105** is currently being disclosed. In yet another embodiment, the communications interface **120** reminds the user via electronic communication other than an automated voice message or an SMS message that the location of the vehicle **105** is currently being disclosed.

Example methods may be better appreciated with reference to the flow diagrams of FIGS. **4** through **7**. While for purposes of simplicity of explanation, the illustrated methodologies are shown and described as a series of blocks, it is to be appreciated that the methodologies are not limited by the order of the blocks, as some blocks can occur in different orders or concurrently with other blocks from that shown or described. Moreover, less than all the illustrated blocks may be required to implement an example methodology. Furthermore, additional or alternative methodologies can employ additional, not illustrated blocks.

In the flow diagrams, blocks denote "processing blocks" that may be implemented with logic. The processing blocks may represent a method step or an apparatus element for performing the method step. A flow diagram does not depict syntax for any particular programming language, methodology, or style (e.g., procedural, object-oriented). Rather, a flow diagram illustrates functional information one skilled in the art may employ to develop logic to perform the illustrated processing. It will be appreciated that in some examples, program elements like temporary variables, routine loops, and so on, are not shown. It will be further appreciated that electronic and software applications may involve dynamic

and flexible processes so that the illustrated blocks can be performed in other sequences that are different from those shown or that blocks may be combined or separated into multiple components. It will be appreciated that the processes may be implemented using various programming approaches like machine language, procedural, object oriented or artificial intelligence techniques.

In one example, methodologies are implemented as processor executable instructions or operations provided on a computer-readable medium. Thus, in one example, a computer-readable medium may store processor executable instructions operable to perform the methods of FIGS. **4** through **7**.

While FIGS. **4** through **7** illustrate various actions occurring in serial, it is to be appreciated that various actions illustrated in FIGS. **4** through **7** could occur substantially in parallel. While a number of processes are described, it is to be appreciated that a greater or lesser number of processes could be employed and that lightweight processes, regular processes, threads, and other approaches could be employed. It is to be appreciated that other example methods may, in some cases, also include actions that occur substantially in parallel.

FIG. **4** illustrates a flow diagram for an exemplary method **400** for monitoring location of a vehicle. At **410**, the method **400** includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle. At **420**, the method **400** includes correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle. At **430**, the method **400** includes transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. In one embodiment, the second electronic signal includes data representing a telephone number associated with the communications device.

At **440**, the method **400** includes receiving a third electronic signal from the location information provider including data representing the location information of the communications device. At **450**, the method **400** includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle. At **460**, the method **400** includes transmitting a fourth electronic signal including data representing the location of the vehicle. In one embodiment, the transmitting the fourth electronic signal including data representing the location of the vehicle includes exposing an application programming interface (API) from which the requesting party can access the location of the vehicle.

In one embodiment, the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device. In one embodiment, the location information of the communications device is originally obtained using a method including at least one of: advance forward link trilateration (AFLT), observed time difference (OTD), Cell-ID (CID), and obtaining a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the user of the communications device is a driver of the vehicle. In one embodiment, the location information provider corresponds to one of: a wireless service provider providing wireless service to the communications device or a third party that obtains the location information from the wireless service provider providing wireless

service to the communications device. In one embodiment, the requesting party corresponds to one of: a freight service provider wherein the location of the vehicle is transmitted to the freight service provider for the freight service provider to have access to location of freight carried by the vehicle, or the driver of the vehicle requesting that the location of the vehicle be transmitted to a freight service provider for the freight service provider to have access to location of freight carried by the vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method **500** for monitoring location of a vehicle. At **510**, the method **500** includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device. The communications device is associated with a user of the communications device who is also associated with the vehicle. At **520**, the method **500** includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device.

At **530**, the method **500** includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle.

In one embodiment, the location information of the communications device is originally obtained by a wireless service provider providing wireless service to the communications device. In one embodiment, the location information of the communications device includes location information obtained in compliance with E911. In one embodiment, the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. In one embodiment, the location information of the communications device is originally obtained through triangulation between radio towers. In one embodiment, the location information of the communications device is originally obtained using a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the location signal is received from one of: a wireless service provider, or a third party who receives the location information from the wireless service provider.

FIG. **6** illustrates a flow diagram for an exemplary method **600** for receiving consent from a user for monitoring the location of a vehicle associated with the user. At **610**, the method **600** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user of the communications device initiates the telephone call. In another embodiment, the user of the communications device receives the telephone call. At **620**, the method **600** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the communications device user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI).

In other embodiments, the identifier is an identifier other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a

Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

At **630**, the method **600** includes transmitting to the communications device a signal including data representing an automated voice message. The automated voice message communicates to the user of the communications device at least one of: (a) a notice including information indicating that consenting to the monitoring of the location of the vehicle would result in the location of the vehicle or the location of the communications device being disclosed, or (b) a location at which to find the notice. At **640**, the method **600** includes receiving from the user via the communications device consent for monitoring the location of the vehicle.

In one embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, once consent has been obtained from the user of the communications device, the method **600** includes periodically communicating to the user via the communications device a notification message indicating that the location is being disclosed.

In one embodiment, after receiving from the user consent for monitoring the location of the vehicle, the method **600** includes transmitting a request for the location information of the communications device and receiving the location information of the communications device.

In one embodiment, after receiving the location information of the communications device, the method **600** includes communicating the location of the vehicle to a receiving party. In one embodiment, communicating the location of the vehicle to a receiving party includes: (a) transmitting the communicating the location of the vehicle to the receiving party through computer communication, or (b) exposing an application programming interface (API) from which the receiving party can access the location of the vehicle.

FIG. **7** illustrates a flow diagram for an exemplary method **700** for receiving from a user a revocation of consent for monitoring the location of a vehicle associated with the user. At **710**, the method **700** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user initiates the telephone call. In another embodiment, the user receives the telephone call. At **720**, the method **700** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI). In other embodiments, the identifier is an identifier other than a telephone number as discussed above in reference to method **600**.

At **730**, the method **700** includes communicating to the user via an automated voice message transmitted to the communications device information indicating that consent to the monitoring of the location of the vehicle associated with the user is revocable via the communications device. At **740**, the method **700** includes receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle associated with the user.

In one embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, the revocation of consent is temporary, and the receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle includes receiving data indicating (a) a time at which consent to the monitoring of the location of the vehicle is revoked, (b) a time until which the consent to the monitoring of the location of the vehicle is revoked, or (c) an interval of time during which the consent to the monitoring of the location of the vehicle is revoked. Consent is revoked at the time indicated or at the beginning of the indicated interval of time. Consent is unrevoked at the indicated time until which the consent to the monitoring of the location of the vehicle is revoked or upon expiration of the indicated interval of time during which the consent to the monitoring of the location of the vehicle is revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "share" using the device **110**. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively. In one embodiment, words other than "hide" or "share" may be used to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively.

FIG. **8** illustrates an exemplary user interface **800** for use in conjunction with a system for monitoring of the location of the vehicle. The user interface **800** is operable by the requesting party or the receiving party to set up monitoring of the location of the vehicle, display information regarding monitoring of the location of the vehicle, and display location of the vehicle.

In the illustrated embodiment, the user interface **800** displays Start/End Monitoring buttons **810***a-g* operable by a user to end or start monitoring of the location of the vehicle. The user interface **800** further displays the Telephone Number corresponding to the communications device associated with a user associated with the vehicle. The user interface **800** further displays the Monitoring Term, which corresponds to the total amount of time (e.g., 2 hours) that the location of the associated vehicle will be monitored. The user interface **800** further displays the Monitoring Interval, which corresponds to how often within the Monitoring Term (e.g., every 15 minutes) the location of the vehicle is updated. In the illustrated embodiment, the user interface **800** displays the Location as latitude and longitude coordinates. In another embodiment, the user interface **800** displays the Location in a format other than latitude and longitude coordinates. In one embodi-

ment, a user may click on Location to display a map that includes a mark indicating the location of the vehicle on the map.

In one embodiment, an operator of a system for monitoring location of a vehicle or some other party who provides vehicle location monitoring services to a user charges fees to the user on a per-load basis or a per-time-monitored basis. A common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This is, at least in part, due to limitations of conventional systems for monitoring vehicle location. The systems and methods for monitoring location of a vehicle disclosed herein provide the provider of vehicle location monitoring services with the ability to charge for the services on a per-load basis or a per-time-monitored basis. For example, a user may operate the user interface **800** or any other means to interface with the system for monitoring location of vehicles to set a time to start or end monitoring of the location of five vehicles (e.g., Start/End Monitoring buttons **810***a-g*).

In one embodiment where the provider of vehicle location monitoring services provides its services on a per-load or a per-time-monitored basis at a set or negotiated rate per load per unit time, the system may keep track of the number of vehicles (i.e., five) whose location is monitored, as well as the total amount of time for which vehicles' location is monitored (i.e., total time×5 vehicles×rate). The operator may use the Monitoring Term to establish the total amount of time (e.g., 2 hours) or the Monitoring Interval to establish the frequency within the Monitoring Term (e.g., every 15 minutes) that the location of the vehicle or vehicles is monitored. With this information available to the operator's billing system, the operator can charge fees to the user on a per-load basis or a per-time-monitored basis.

In the illustrated embodiment, the user interface displays a Partner/Code. The Partner/Code field may display a code corresponding to a partner company or driver. For example, a carrier A may subcontract with another carrier NAT to move freight from location 1 to location 2. The user interface displays the carrier NAT associated with the Telephone Number 555-555-5555.

The user interface **800** further displays a Reference Number. In one embodiment, the Reference Number field is a customizable field that carriers can use to identify a particular load, a particular vehicle, a particular order, etc. In one embodiment, the Reference Number appears in invoices and other documents to facilitate efficient system administration.

The user interface **800** further displays the Status of the vehicle. For example, the Status may indicate that the system is Monitoring the vehicle. In another example, the Status may display that the vehicle is Hidden to indicate that the user associated with the vehicle has temporarily revoked consent to monitoring of the vehicle's location. Other possible Status indicators include: (a) Ready to monitor, which indicates that the monitoring of the location of the vehicle is setup and the system is awaiting location information data, (b) Expired, which indicates that the Monitoring Term has expired, and (c) Denied, which indicates that the user denied consent to monitoring the location of the vehicle.

In one embodiment, the user interface **800** is used to add vehicles whose location is to be monitored. A user may use field **820** to enter the identifier corresponding to the communications device associated with the vehicle whose location is to be monitored. In one embodiment (not illustrated), the user interface **800** provides a pull-down menu from which the user may chose an identifier. The user may further enter the Monitoring Term in field **830**, the Monitoring Interval in field **840**, the Partner/Code in field **850** and the Reference Number in field **860**. In one embodiment (not illustrated), the user interface **800** provides each of these fields as pull-down menus.

In some cases, the requesting party may not know the identifier corresponding to the vehicle or the user may know the identifier but not have authorization to monitoring the location of the vehicle associated with the identifier. In one embodiment (not shown), the user may enter a Partner/Code that serves as verification that the user has obtained authorization from the partner to monitor location of the vehicle associated with the identifier. This feature may also serve to keep the user from learning the identifier in cases where the user associated with the vehicle, the partner, or some other party desires not to reveal the identifier to the requesting party.

In one embodiment, the user associated with the vehicle (e.g., driver) may enter the Partner/Code. For example, the user associated with the vehicle may be an independent driver who wishes for the location information of his vehicle to be monitored by a carrier so that the carrier may assign freight for the driver to haul. However, the carrier may not want every driver in the field to do this freely because of the potential costs associated with monitoring the location of a large number of vehicles. The carrier may require the driver to enter a Partner/Code obtained from the carrier that serves as verification that the driver has obtained authorization from the carrier for the location of the driver's vehicle to be monitored by the carrier.

Referring now to FIG. **9**, an application programming interface (API) **900** is illustrated providing access to a system **910** for monitoring location of a vehicle to a receiving party. The API **900** can be employed, for example, by a programmer **920** or a process **930** to gain access to processing performed by the system **910**. For example, a programmer **920** can write a program to access the system **910** (e.g., invoke its operation, obtain its operation, set up its operation, monitor location of a vehicle) where writing the program is facilitated by the presence of the API **900**. Rather than programmer **920** having to understand the internals of the system **910**, the programmer **920** merely has to learn the interface to the system **910**. This facilitates encapsulating the functionality of the system **910** while exposing that functionality.

Similarly, the API **900** can be employed to provide data values to the system **910** or retrieve data values from the system **910**. For example, a process **930** that processes location of a vehicle can provide an identifier to the system **910** via the API **900** by, for example, using a call provided in the API **900**. Thus, in one example of the API **900**, a set of application programming interfaces can be stored on a computer-readable medium. The interfaces can be employed by a programmer, computer component, logic, and so on, to gain access to a system **910** for monitoring location of a vehicle.

FIG. **10** illustrates a computer **1000** that includes a processor **1002**, a memory **1004**, and I/O Ports **1010** operably connected by a bus **1008**. In one example, the computer **1000** may include a validation logic **1030** configured to facilitate validation of a communications device. Thus, the validation logic **1030**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for identifying the communications device at least in part by obtaining an identifier associated with the communications device. In another example, the computer **1000** may include a notification logic **1040** configured to provide notification to the user associated with a vehicle. Thus, the notification logic **1040**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for communicating a signal including data representing automated voice messages that provide

notices or directs the user of the communications device to notices that include information indicating (a) that consenting to the monitoring of the vehicle will result in the location information of the vehicle or the communications device being disclosed, (b) that the user may revoke notice by operation of the communications device, and so on. In yet another example, the computer **1000** may include a correlation logic **1070** configured to correlate a vehicle to a communications device or the location information of a communications device to the location of a vehicle based at least in part on the communications device being associated with a user of the communications device who is associated with the vehicle. Thus, the correlation logic **1070**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for correlating a vehicle to a communications device based at least in part on the communications device being associated with the user who is associated with the vehicle, means for correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, or means for transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle. The validation logic **1030**, the notification logic **1040**, or the correlation logic **1070** may be permanently or removably attached to the computer **1000**.

The processor **1002** can be a variety of various processors including dual microprocessor and other multi-processor architectures. The memory **1004** can include volatile memory or non-volatile memory. The non-volatile memory can include, but is not limited to, ROM, PROM, EPROM, EEPROM, and the like. Volatile memory can include, for example, RAM, synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), and direct RAM bus RAM (DRRAM).

A disk **1006** may be operably connected to the computer **1000** via, for example, a communications interface (e.g., card, device) **1018** and an I/O Ports **1010**. The disk **1006** can include, but is not limited to, devices like a magnetic disk drive, a solid state disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, or a memory stick. Furthermore, the disk **1006** can include optical drives like a CD-ROM, a CD recordable drive (CD-R drive), a CD rewriteable drive (CD-RW drive), or a digital video ROM drive (DVD ROM). The memory **1004** can store processes **1014** or data **1016**, for example. The disk **1006** or memory **1004** can store an operating system that controls and allocates resources of the computer **1000**.

The bus **1008** can be a single internal bus interconnect architecture or other bus or mesh architectures. While a single bus is illustrated, it is to be appreciated that computer **1000** may communicate with various devices, logics, and peripherals using other busses that are not illustrated (e.g., PCIE, SATA, Infiniband, 1394, USB, Ethernet). The bus **1008** can be of a variety of types including, but not limited to, a memory bus or memory controller, a peripheral bus or external bus, a crossbar switch, or a local bus. The local bus can be of varieties including, but not limited to, an industrial standard architecture (ISA) bus, a microchannel architecture (MCA) bus, an extended ISA (EISA) bus, a peripheral component interconnect (PCI) bus, a universal serial (USB) bus, and a small computer systems interface (SCSI) bus.

The computer **1000** may interact with input/output devices via communications interface **1018** and I/O Ports **1010**. Input/output devices can include, but are not limited to, a keyboard, a microphone, a pointing and selection device, cameras, video cards, displays, disk **1006**, network devices **1020**, and the like. The I/O Ports **1010** can include but are not limited to, serial ports, parallel ports, and USB ports.

The computer **1000** can operate in a network environment and thus may be connected to network devices **1020** via the communications interface **1018**, or the I/O Ports **1010**. Through the network devices **1020**, the computer **1000** may interact with a network. Through the network, the computer **1000** may be logically connected to remote computers. The networks with which the computer **1000** may interact include, but are not limited to, a local area network (LAN), a wide area network (WAN), and other networks. The network devices **1020** can connect to LAN technologies including, but not limited to, fiber distributed data interface (FDDI), copper distributed data interface (CDDI), Ethernet (IEEE 802.3), token ring (IEEE 802.5), wireless computer communication (IEEE 802.11), Bluetooth (IEEE 802.15.1), Zigbee (IEEE 802.15.4) and the like. Similarly, the network devices **1020** can connect to WAN technologies including, but not limited to, point to point links, circuit switching networks like integrated services digital networks (ISDN), packet switching networks, LTE networks, GSM networks, GPRS networks, CDMA networks, and digital subscriber lines (DSL). While individual network types are described, it is to be appreciated that communications via, over, or through a network may include combinations and mixtures of communications.

DEFINITIONS

The following includes definitions of selected terms employed herein. The definitions include various examples, forms, or both of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Both singular and plural forms of terms may be within the definitions.

As used in this application, the term "computer component" refers to a computer-related entity, either hardware, firmware, software, a combination thereof, or software in execution. For example, a computer component can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and a computer. By way of illustration, both an application running on a server and the server can be computer components. One or more computer components can reside within a process or thread of execution and a computer component can be localized on one computer or distributed between two or more computers.

"Computer communication," as used herein, refers to a communication between two or more computing devices (e.g., computer, personal digital assistant, cellular telephone) and can be, for example, a network transfer, a file transfer, an applet transfer, an email, a hypertext transfer protocol (HTTP) transfer, and so on. A computer communication can occur across, for example, a wireless system (e.g., IEEE 802.11, IEEE 802.15), an Ethernet system (e.g., IEEE 802.3), a token ring system (e.g., IEEE 802.5), a local area network (LAN), a wide area network (WAN), a point-to-point system, a circuit switching system, a packet switching system, combinations thereof, and so on.

"Computer-readable medium," as used herein, refers to a medium that participates in directly or indirectly providing signals, instructions or data. A computer-readable medium may take forms, including, but not limited to, non-volatile

media, volatile media, and transmission media. Non-volatile media may include, for example, optical or magnetic disks, and so on. Volatile media may include, for example, optical or magnetic disks, dynamic memory and the like. Transmission media may include coaxial cables, copper wire, fiber optic cables, and the like. Transmission media can also take the form of electromagnetic radiation, like that generated during radio-wave and infra-red data communications, or take the form of one or more groups of signals. Common forms of a computer-readable medium include, but are not limited to, a floppy disk, a flexible disk, a hard disk, a magnetic tape, other magnetic media, a CD-ROM, other optical media, punch cards, paper tape, other physical media with patterns of holes, a RAM, a ROM, an EPROM, a FLASH-EPROM, or other memory chip or card, a memory stick, a carrier wave/pulse, and other media from which a computer, a processor or other electronic device can read. Signals used to propagate instructions or other software over a network, like the Internet, can be considered a "computer-readable medium."

"Data store," as used herein, refers to a physical or logical entity that can store data. A data store may be, for example, a database, a table, a file, a list, a queue, a heap, a memory, a register, and so on. A data store may reside in one logical or physical entity or may be distributed between two or more logical or physical entities.

A "logic," as used herein, includes but is not limited to hardware, firmware, software or combinations of each to perform a function(s) or an action(s), or to cause a function or action from another logic, method, or system. For example, based on a desired application or needs, a logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), a programmed logic device, a memory device containing instructions, or the like. A logic may include one or more gates, combinations of gates, or other circuit components. A logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

An "operable connection," or a connection by which entities are "operably connected," is one in which signals, physical communications, or logical communications may be sent or received. Typically, an operable connection includes a physical interface, an electrical interface, or a data interface, but it is to be noted that an operable connection may include differing combinations of these or other types of connections sufficient to allow operable control. For example, two entities can be operably connected by being able to communicate signals to each other directly or through one or more intermediate entities like a processor, operating system, a logic, software, or other entity. Logical or physical communication channels can be used to create an operable connection.

"Signal," as used herein, includes but is not limited to one or more electrical or optical signals, analog or digital signals, data, one or more computer or processor instructions, messages, a bit or bit stream, or other means that can be received, transmitted or detected.

"Software," as used herein, includes but is not limited to, one or more computer or processor instructions that can be read, interpreted, compiled, or executed and that cause a computer, processor, or other electronic device to perform functions, actions or behave in a desired manner. The instructions may be embodied in various forms like routines, algorithms, modules, methods, threads, or programs including separate applications or code from dynamically or statically linked libraries. Software may also be implemented in a variety of executable or loadable forms including, but not limited to, a stand-alone program, a function call (local or remote), a servelet, an applet, instructions stored in a memory, part of an operating system or other types of executable instructions. It will be appreciated by one of ordinary skill in the art that the form of software may depend, for example, on requirements of a desired application, the environment in which it runs, or the desires of a designer/programmer or the like. It will also be appreciated that computer-readable or executable instructions can be located in one logic or distributed between two or more communicating, co-operating, or parallel processing logics and thus can be loaded or executed in serial, parallel, massively parallel and other manners.

Suitable software for implementing the various components of the example systems and methods described herein may be produced using programming languages and tools like Java, Java Script, Java.NET, ASP.NET, VB.NET, Cocoa, Pascal, C#, C++, C, CGI, Perl, SQL, APIs, SDKs, assembly, firmware, microcode, or other languages and tools. Software, whether an entire system or a component of a system, may be embodied as an article of manufacture and maintained or provided as part of a computer-readable medium as defined previously. Another form of the software may include signals that transmit program code of the software to a recipient over a network or other communication medium. Thus, in one example, a computer-readable medium has a form of signals that represent the software/firmware as it is downloaded from a web server to a user. In another example, the computer-readable medium has a form of the software/firmware as it is maintained on the web server. Other forms may also be used.

"User," as used herein, includes but is not limited to one or more persons, software, computers or other devices, or combinations of these.

To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the detailed description or claims (e.g., A or B) it is intended to mean "A or B or both". When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995).

While example systems, methods, and so on, have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on, described herein. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention is not limited to the specific details, and illustrative examples shown or described. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims. Furthermore, the preceding description is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.

The invention claimed is:

1. A method for a machine or group of machines to monitor location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle;

correlating, by a CPU, the vehicle or the freight carried by the vehicle to a communications device;

transmitting a location information request signal including data representing a request for location information of the communications device to a location information provider;

receiving a signal including data that indicates consent to transmission of location information of the communications device;

receiving a location information signal including data representing the location information of the communications device from the location information provider;

correlating, by the CPU or a second CPU, the location information of the communications device to the location of the vehicle or the freight carried by the vehicle based at least in part on the correlation of the vehicle or the freight carried by the vehicle to the communications device; and

transmitting a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause a representation of the location of the vehicle or the freight carried by the vehicle on a remote device.

2. The method of claim **1**, wherein the correlating the vehicle or the freight carried by the vehicle to the communications device includes at least one of correlating a vehicle reference number or a freight reference number, respectively, to the communications device.

3. The method of claim **1**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

4. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including at least one of:

a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device, or

a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

5. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as a) latitude and longitude coordinates, b) city/state, or c) a map that includes a mark indicating the location of the vehicle on the map.

6. The method of claim **1**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

7. The method of claim **1**, wherein the location information signal is also the signal including data that indicates consent to transmission of the location information.

8. A method for a machine or group of machines to monitor location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving from a location information provider a location information signal including data representing location information of a communications device that originated from a device other than the communications device itself, wherein the data representing the location information of the communications device indicates consent to transmission of location information of the communications device;

correlating, by a CPU, the vehicle or the freight carried by the vehicle to the communications device;

receiving a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle;

correlating, by the CPU or another CPU, the location information from the location information provider that originated from the device other than the communications device itself to the location of the vehicle or the freight carried by the vehicle based at least in part on the correlation of the vehicle or the freight carried by the vehicle to the communications device; and

transmitting a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause the display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface.

9. The method of claim **8**, wherein the correlating the vehicle or the freight carried by the vehicle to the communications device includes at least one of correlating a vehicle reference number or a freight reference number, respectively, to the communications device.

10. The method of claim **8**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

11. The method of claim **8**, wherein the location information of the communications device is originally obtained using a method including at least one of:

a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device, or

a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

12. The method of claim **8**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes at least one of:

exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted, or

interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

13. The method of claim **8**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

14. The method of claim **8**, wherein the location signal is configured to cause the display of the visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as a) latitude and longitude coordinates, b) city/state, or c) a map that includes a mark indicating the location of the vehicle on the map.

15. A machine or group of machines embodying a system for monitoring location of at least one of a vehicle or freight carried by the vehicle, the system comprising:

a communications interface in the machine or group of machines configured to communicate electronic signals including:

a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle; and

a correlation logic in the machine or group of machines configured to correlate, by a CPU, the vehicle or the freight carried by the vehicle to a communications device,

wherein

the communications interface is further configured to communicate:

a location information request signal including data representing a request for location information of the communications device to a location information provider;

a signal including data that indicates that a user of the communications device consented to transmission of location information;

a location information signal from the location information provider including data representing location information of the communications device that originated from a device other than the communications device itself; and

the correlation logic is further configured to correlate the location information from the location information provider that originated from the device other than the communications device itself to the location of the vehicle or the freight carried by the vehicle based at least in part on the correlation of the vehicle or the freight carried by the vehicle to the communications device; and

the communications interface is further configured to communicate a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause a representation of the location of the vehicle or the freight carried by the vehicle.

16. The system of claim **15**, wherein the correlation logic correlates the vehicle or the freight carried by the vehicle to the communications device by correlating a vehicle reference number or a freight reference number, respectively, to the communications device.

17. The system of claim **15**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

18. The system of claim **15**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes at least one of the communications interface:

exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted, or

interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

19. The system of claim **15**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes the communications interface transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

20. The system of claim **15**, wherein the location information signal is also the signal including data that indicates that the user of the communications device consented to transmission of the location information.

21. The system of claim **15**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as a) latitude and longitude coordinates, b) city/state, or c) a map that includes a mark indicating the location of the vehicle on the map.

22. A method for a machine or group of machines to monitor location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving from a location information provider a location information signal including data representing location information of a communications device that originated from the communications device itself, wherein the data representing the location information of the communications device indicates consent to transmission of location information of the communications device;

correlating, by a CPU, the vehicle or the freight carried by the vehicle to the communications device;

receiving a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle;

correlating, by the CPU or another CPU, the location information from the location information provider that originated from a device other than the communications device itself to the location of the vehicle or the freight carried by the vehicle based at least in part on the correlation of the vehicle or the freight carried by the vehicle to the communications device; and

transmitting a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause the display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface.

23. The method of claim **22**, wherein the correlating the vehicle or the freight carried by the vehicle to the communications device includes at least one of correlating a vehicle reference number or a freight reference number, respectively, to the communications device.

24. The method of claim **22**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

25. The method of claim **22**, wherein the location information of the communications device is originally obtained using a method including a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

26. The method of claim **22**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes at least one of:

exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted, or

interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

27. The method of claim **22**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

28. The method of claim **22**, wherein the location signal is configured to cause the display of the visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as a) latitude and longitude coordinates, b) city/state, or c) a map that includes a mark indicating the location of the vehicle on the map.

* * * * *

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(12) **United States Patent**
Adelson

(10) **Patent No.: US 9,082,098 B1**

(45) **Date of Patent: *Jul. 14, 2015**

(54) **SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE**

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(72) Inventor: **Bennett H. Adelson**, Highland Heights, OH (US)

(73) Assignee: **MACROPOINT, LLC**, Cleveland, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/661,769**

(22) Filed: **Mar. 18, 2015**

Related U.S. Application Data

(63) Continuation of application No. 14/069,364, filed on Oct. 31, 2013, which is a continuation of application No. 13/613,321, filed on Sep. 13, 2012, now Pat. No. 8,604,943, which is a continuation of application No. 13/429,618, filed on Mar. 26, 2012, now Pat. No. 8,330,626.

(51) **Int. Cl.**

G08B 21/00	(2006.01)
G06Q 10/08	(2012.01)
G06Q 10/06	(2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 10/08*** (2013.01); ***G06Q 10/0631*** (2013.01)

(58) **Field of Classification Search**
CPC G06Q 10/0833; G08G 1/20; G08G 1/205
USPC 340/988–994, 995.1; 701/1, 2, 32.3, 701/454, 467, 482, 485; 348/116
See application file for complete search history.

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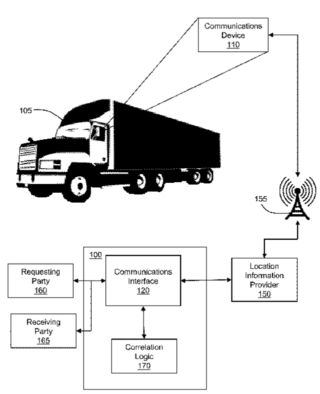
Primary Examiner — Mark Rushing
(74) *Attorney, Agent, or Firm* — Renner, Otto, Boisselle & Sklar, LLP.

(57) **ABSTRACT**

Monitoring location of a vehicle or freight includes receiving a request for information regarding the location of the vehicle or the freight, receiving an indication of consent to transmission of location information of the communications device, correlating the vehicle or the freight with the communications device, transmitting a request for location information of the communications device to a location information provider corresponding to a party or device other than the communications device, receiving the location information of the communications device from the location information provider, correlating the location information of the communications device to the location of the vehicle or the freight based on the correlation of the vehicle or the freight to the communications device, and transmitting the location of the vehicle or the freight.

20 Claims, 10 Drawing Sheets



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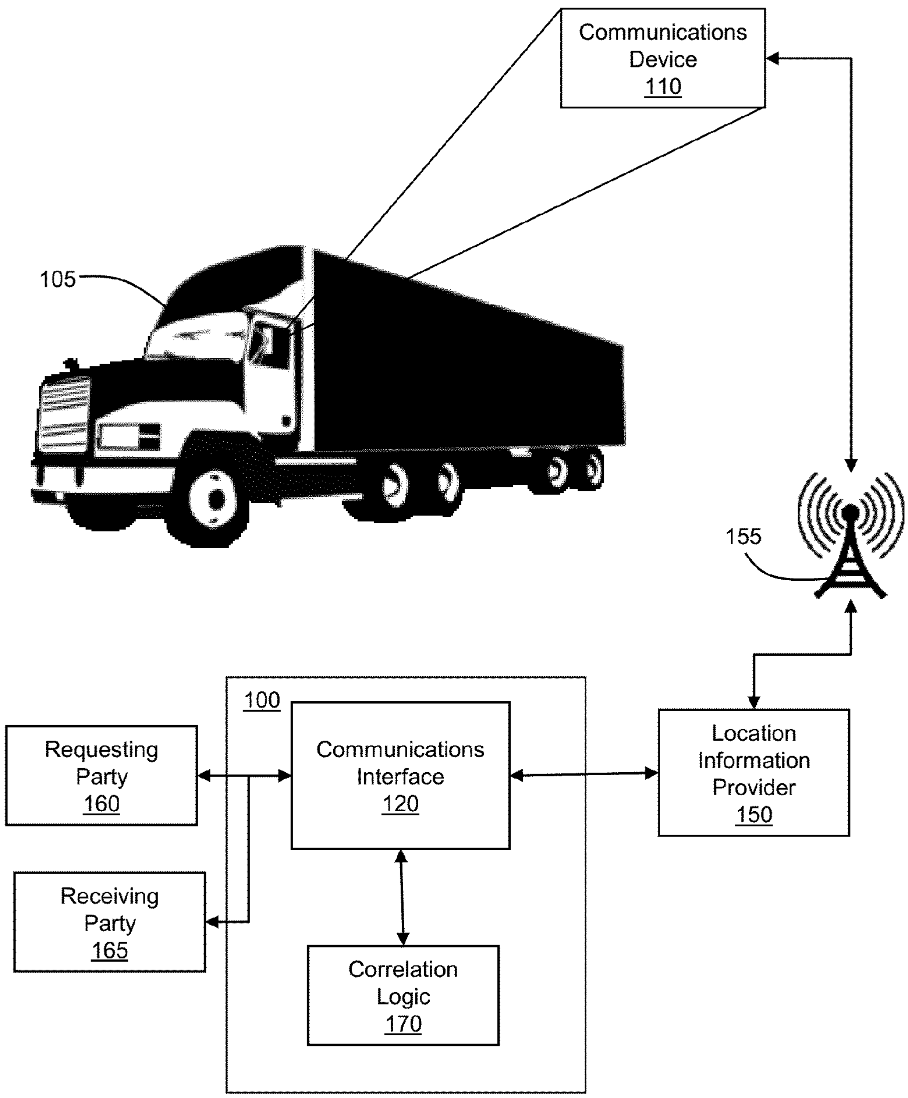


Communications Device 110
105
155
100
Requesting Party 160
Communications Interface 120
Location Information Provider 150
Receiving Party 165
Correlation Logic 170

Figure 1

200

220 230

	Active Driver <u>210a</u>	**Active Device <u>110a</u>**	**Backup Driver <u>210b</u>**	**Backup Device <u>110b</u>**	**Total Capacity ft^3 / lbs.**	**Available Capacity ft^3 / lbs.**
[redacted]						
105b	Gary Fisher	(546) 542-1235			3,931 42,010	2,531 22,010
[redacted]						
105d	Colnago Cinelli	(563) 543-5635	Ross Raleigh	(243) 546-5435	2,878 <u>Ref</u> 36,280	2,878 <u>Ref.</u> 36,280
[redacted]						
105f	Emilio Bozzi	(507) 543-5475	Murray Schwinn	(548) 243-5433	3,268 41,700	0 0
[redacted]						

Figure 2

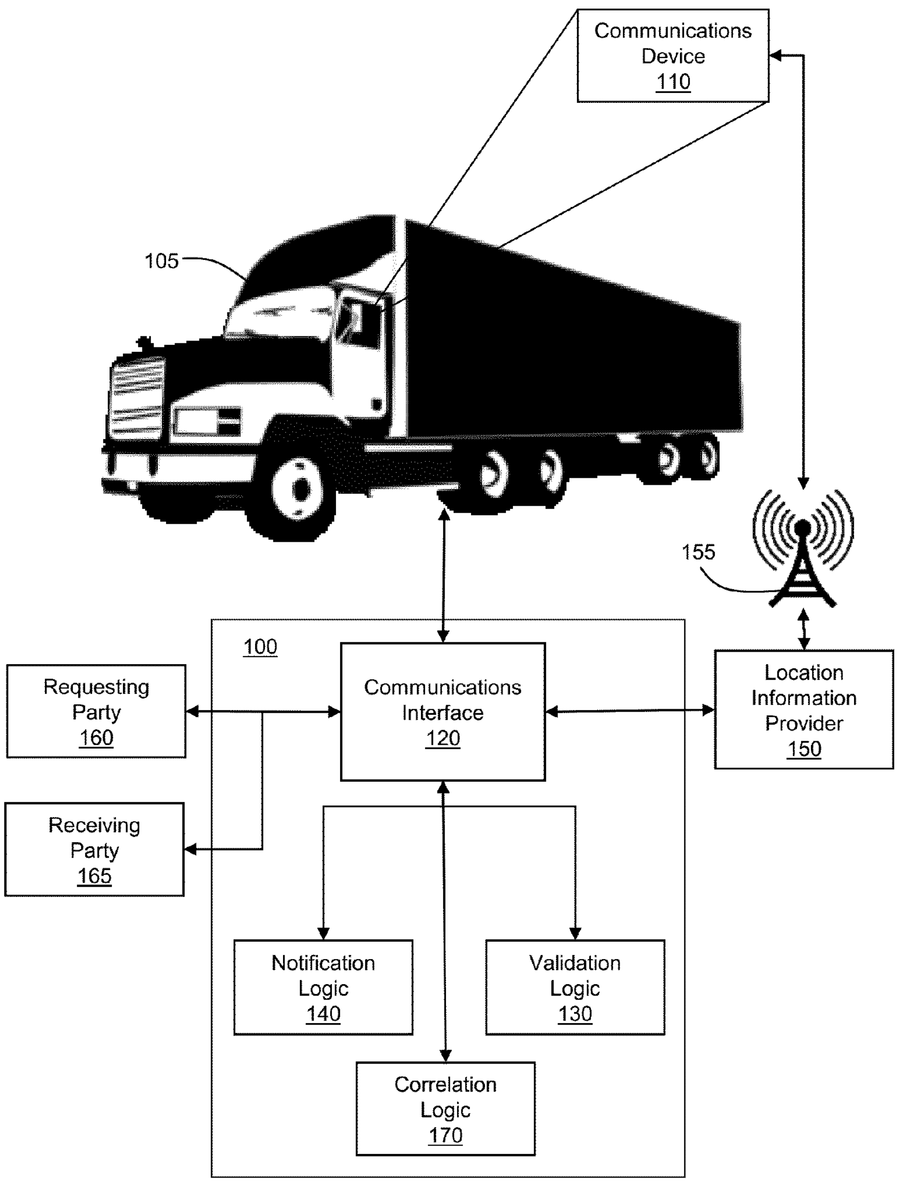

Communications
Device
110
105
155
100
Requesting
Party
160
Communications
Interface
120
Location
Information
Provider
150
Receiving
Party
165
Notification
Logic
140
Validation
Logic
130
Correlation
Logic
170

Figure 3

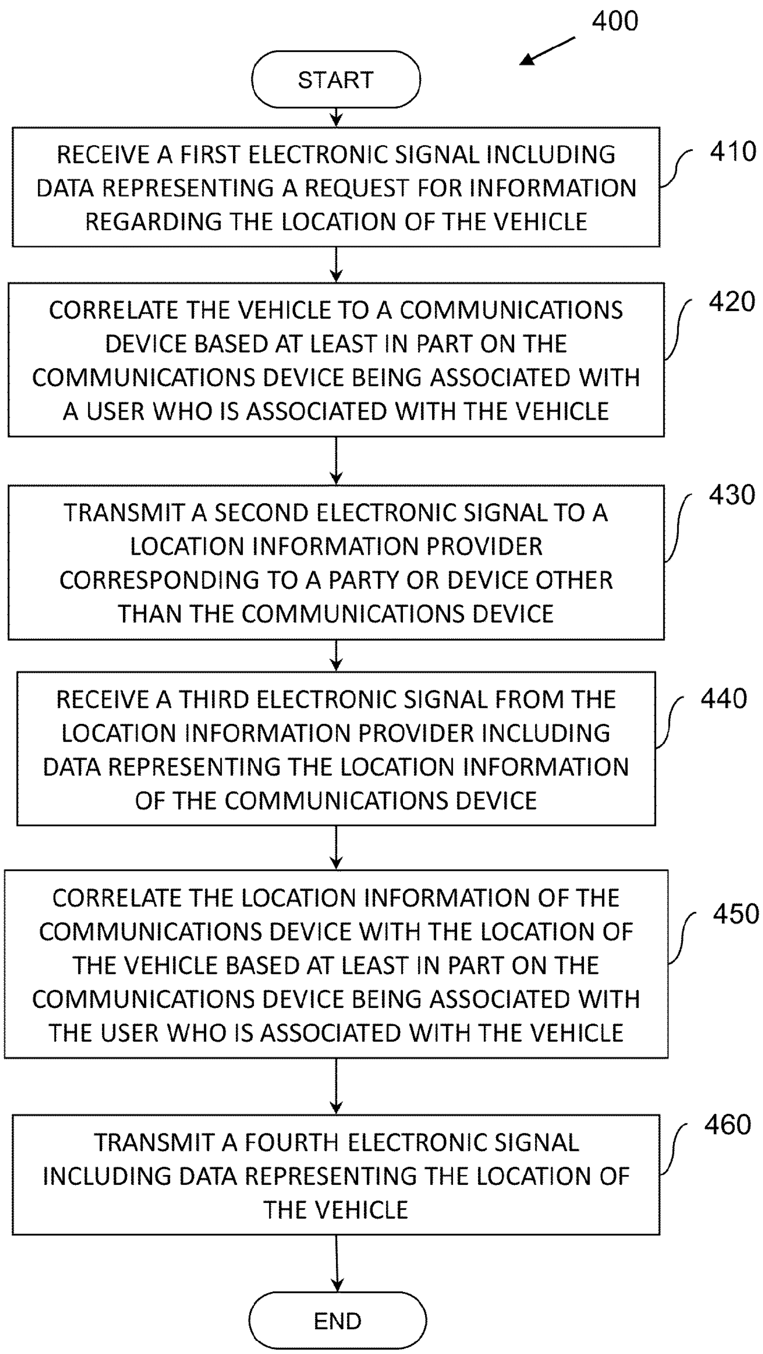

400
START
RECEIVE A FIRST ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING A REQUEST FOR INFORMATION REGARDING THE LOCATION OF THE VEHICLE
410
CORRELATE THE VEHICLE TO A COMMUNICATIONS DEVICE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH A USER WHO IS ASSOCIATED WITH THE VEHICLE
420
TRANSMIT A SECOND ELECTRONIC SIGNAL TO A LOCATION INFORMATION PROVIDER CORRESPONDING TO A PARTY OR DEVICE OTHER THAN THE COMMUNICATIONS DEVICE
430
RECEIVE A THIRD ELECTRONIC SIGNAL FROM THE LOCATION INFORMATION PROVIDER INCLUDING DATA REPRESENTING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
440
CORRELATE THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE WITH THE LOCATION OF THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER WHO IS ASSOCIATED WITH THE VEHICLE
450
TRANSMIT A FOURTH ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING THE LOCATION OF THE VEHICLE
460
END

Figure 4

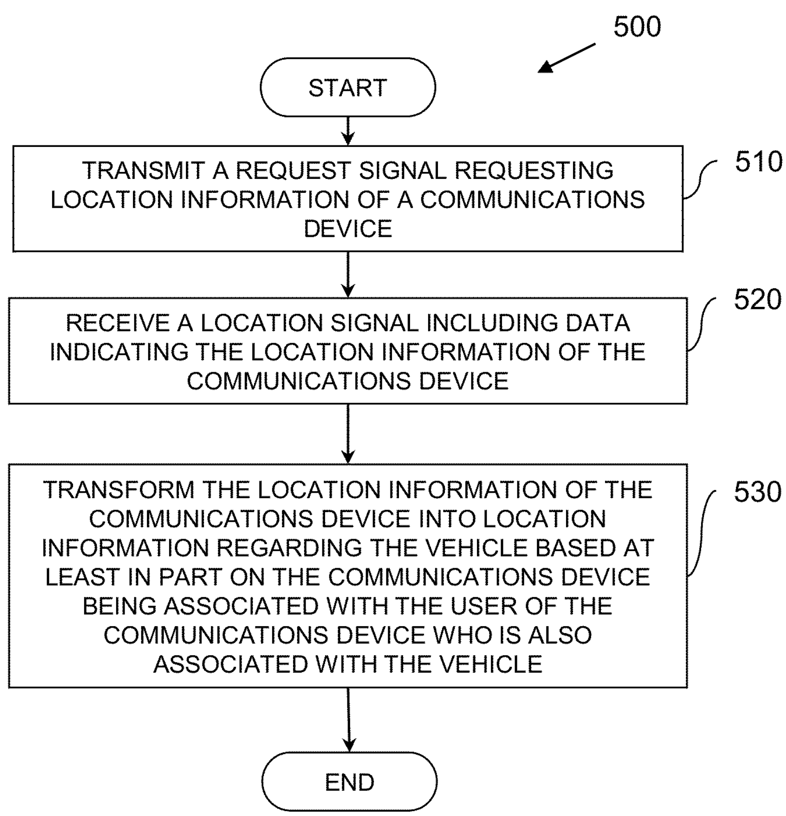

500
START
TRANSMIT A REQUEST SIGNAL REQUESTING LOCATION INFORMATION OF A COMMUNICATIONS DEVICE
510
RECEIVE A LOCATION SIGNAL INCLUDING DATA INDICATING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
520
TRANSFORM THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE INTO LOCATION INFORMATION REGARDING THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER OF THE COMMUNICATIONS DEVICE WHO IS ALSO ASSOCIATED WITH THE VEHICLE
530
END

Figure 5

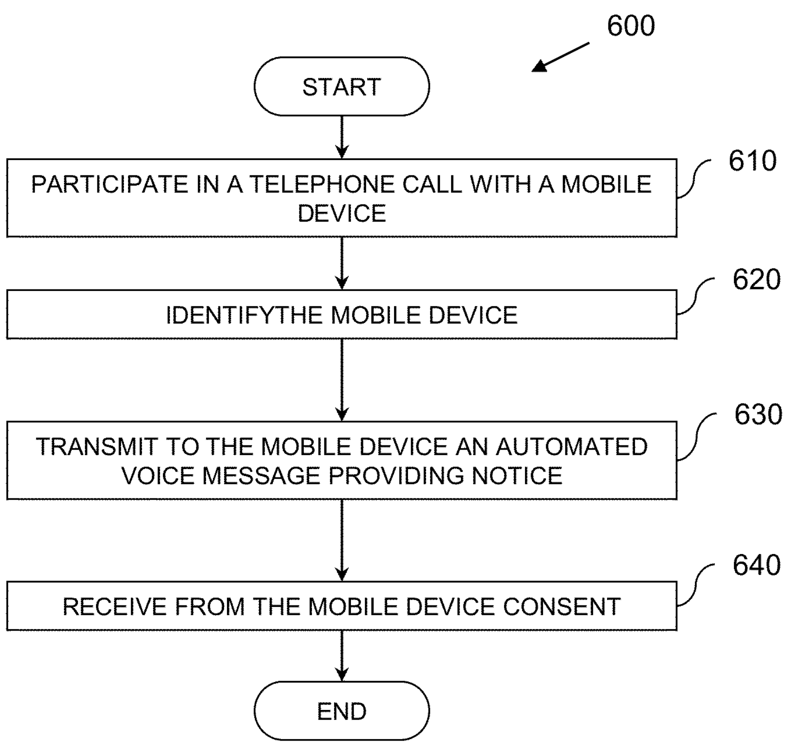

600
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
610
IDENTIFYTHE MOBILE DEVICE
620
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE PROVIDING NOTICE
630
RECEIVE FROM THE MOBILE DEVICE CONSENT
640
END

Figure 6

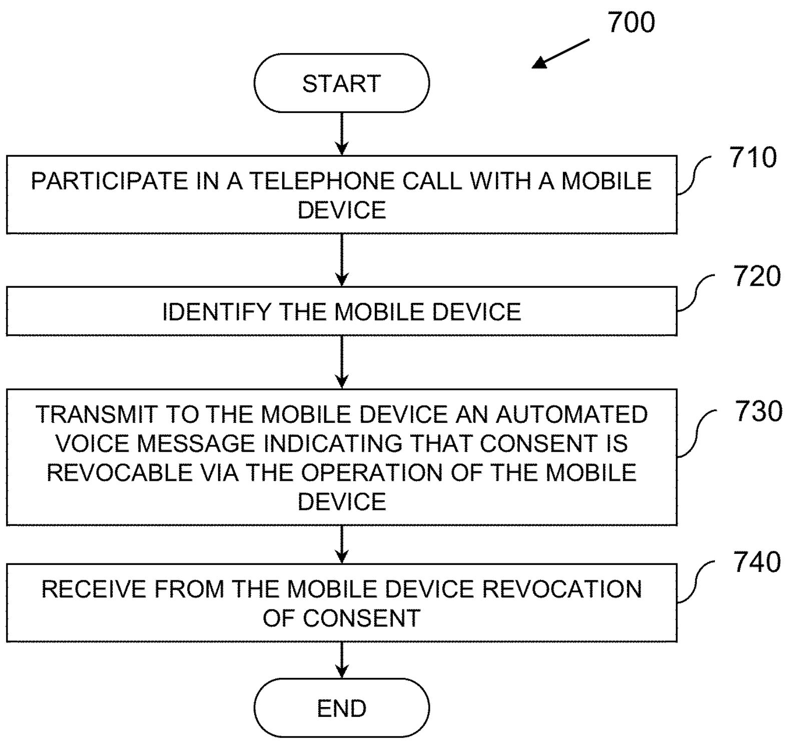
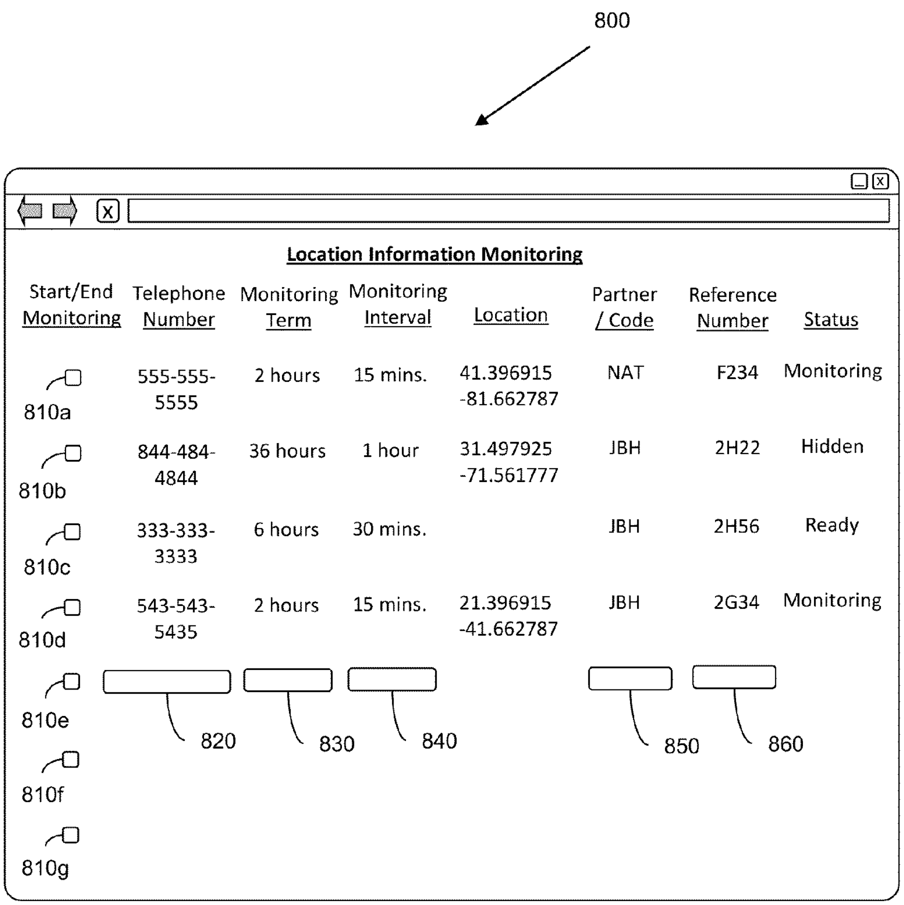

700
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
710
IDENTIFY THE MOBILE DEVICE
720
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE INDICATING THAT CONSENT IS REVOCABLE VIA THE OPERATION OF THE MOBILE DEVICE
730
RECEIVE FROM THE MOBILE DEVICE REVOCATION OF CONSENT
740
END

Figure 7


800
Location Information Monitoring
Start/End Monitoring
Telephone Number
Monitoring Term
Monitoring Interval
Location
Partner / Code
Reference Number
Status
810a
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41.396915 -81.662787
NAT
F234
Monitoring
810b
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36 hours
1 hour
31.497925 -71.561777
JBH
2H22
Hidden
810c
333-333-3333
6 hours
30 mins.
JBH
2H56
Ready
810d
543-543-5435
2 hours
15 mins.
21.396915 -41.662787
JBH
2G34
Monitoring
810e
820
830
840
850
860
810f
810g

Figure 8

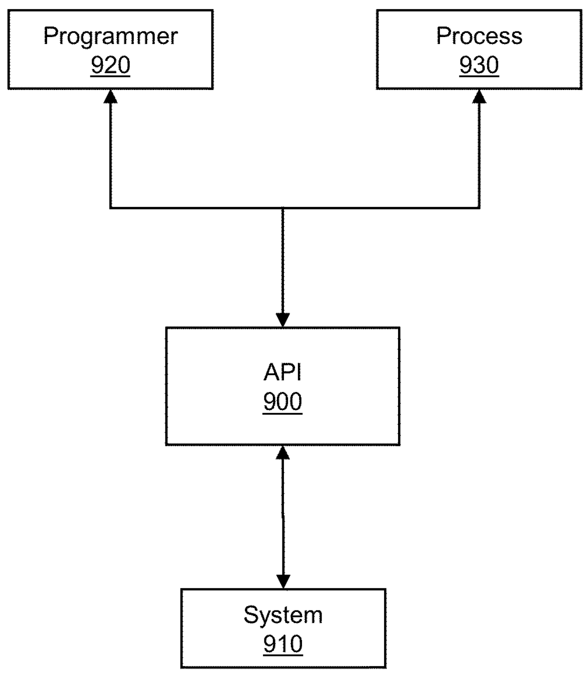

Figure 9

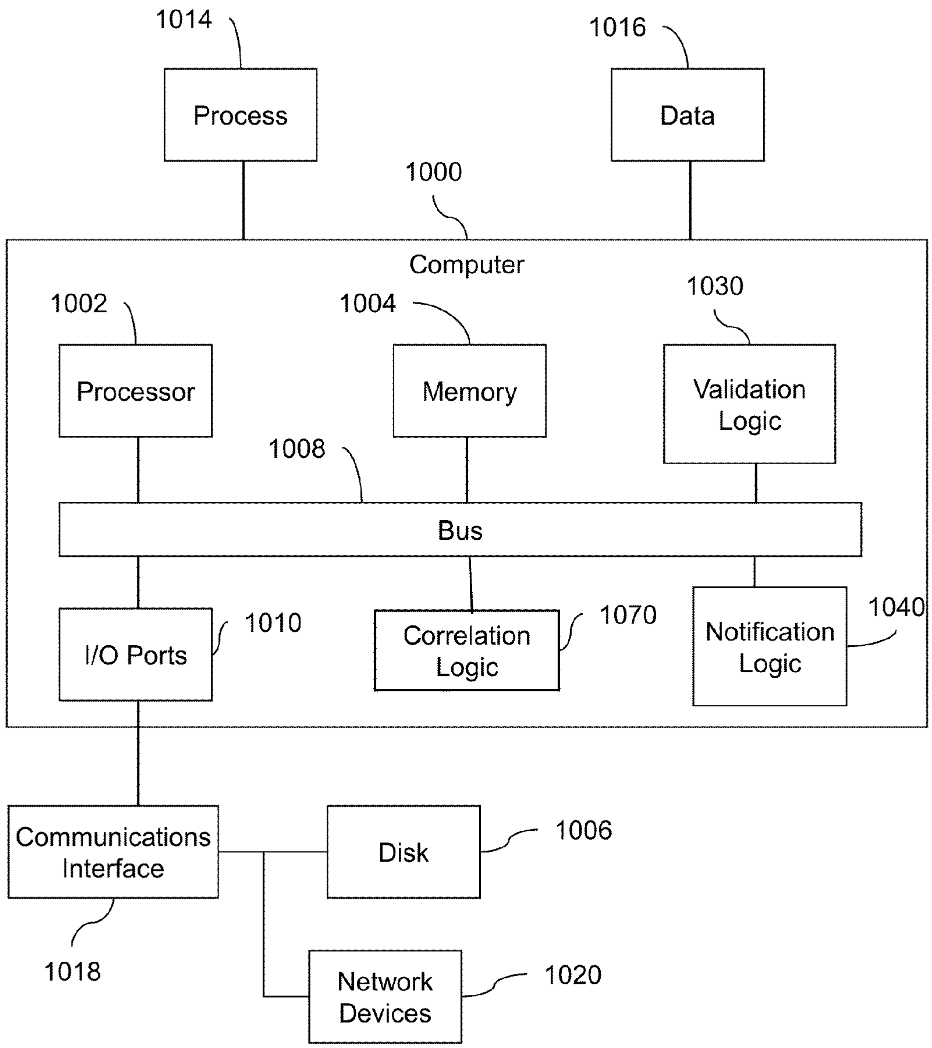
1014
Process
1016
Data
1000
Computer
1002
Processor
1004
Memory
1030
Validation Logic
1008
Bus
I/O Ports
1010
Correlation Logic
1070
Notification Logic
1040
Communications Interface
1018
Disk
1006
Network Devices
1020

Figure 10

SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE

TECHNICAL FIELD

The present disclosure relates to systems and methods for monitoring location.

BACKGROUND

Location information is becoming more important and prevalent.

In one example application of the use of location information, carriers, shippers, freight hauling services providers, third-party logistics service providers and courier services providers as well as other logistics and freight service providers (freight hauling) benefit from monitoring the location of vehicles in their fleets or under contract. Monitoring the location of vehicles helps improve efficiency because it allows for real-time or near real-time decision making when matching loads with vehicles. For example, by monitoring the location of fleet vehicles, a dispatcher may better understand which vehicle is the most appropriate (e.g., geographically closest, appropriate size, etc.) to send to a location for a load pickup. Conventional systems for monitoring vehicle location have relied on global positioning systems (GPS) to provide the vehicle's location. These systems require a GPS receiver to be installed in each vehicle. Moreover, some of these systems require the installation of additional dedicated equipment in each vehicle.

In addition, at least in part due to limitations of conventional systems for monitoring vehicle location, a common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This practice may represent a substantial cost to a user or organization that, for example, may wish to monitor a relatively small number of vehicles or a relatively small number of loads for a relatively short amount of time.

SUMMARY

Alternative methods for monitoring location of vehicles include radiolocation techniques including triangulation or multilateration methods that are capable of locating devices in a network. These methods involve the measurement of radio signals between a device and radio towers in the network. The technology, originally intended by telecommunication companies to approximate the location of a mobile phone in case of emergencies, provides the location of a device in the network.

The use of all of these location information technologies also raises privacy issues. A user's privacy may be at risk if location information is misused or disclosed without the authorization or knowledge of the user. To address these privacy concerns, various governmental and business organizations have developed rules and guidelines to protect user privacy. For example, the International Association for the Wireless Telecommunications Industry (CTIA) has developed Best Practices and Guidelines for Location-Based Services (the "CTIA Guidelines"), which are hereby incorporated by reference.

The Guidelines provide a framework based on two principles: user notice and consent. Users must receive "meaningful notice about how location information will be used, disclosed and protected so that users can make informed decisions . . . and . . . have control over their location information." Users must also "consent to the use or disclosure of location information" and "have the right to revoke consent . . . at any time."

Although, electronic methods have been developed that make use of web browsers and SMS texting capabilities of mobile devices to provide notification and consent, some of these systems have proved inconvenient and may require advanced mobile devices or extensive user training.

A computer implemented method for monitoring location of a vehicle includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle, correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle, and transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes receiving a third electronic signal from the location information provider. The third electronic signal includes data representing the location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, and transmitting a fourth electronic signal including data representing the location of the vehicle.

Another computer implemented method for monitoring location of a vehicle includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device and the communications device is associated with a user of the communications device who is associated with the vehicle. The computer implemented method for monitoring location of a vehicle further includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device and the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. The computer implemented method for monitoring location of a vehicle further includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

A system for monitoring location of a vehicle includes a communications interface configured to communicate electronic signals including: a first electronic signal including data representing a request for the location of the vehicle, the first electronic signal received from a requesting party, a second electronic signal including data representing a request for location information of a communications device, wherein the second electronic signal is transmitted to a location information provider corresponding to a party or device other than the communications device, wherein the communications device is associated with a user of the communications device who is associated with the vehicle, a third electronic signal including data representing the location information of the communications device, wherein the third electronic signal is received from the location information provider corresponding to the party or device other than the

communications device, and a fourth electronic signal including data representing the location of the vehicle, the fourth electronic signal transmitted to a receiving party. The system for monitoring location of a vehicle further includes a correlation logic configured to correlate the location information of the communications device to the location of the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various example systems, methods, and so on, that illustrate various example embodiments of aspects of the invention. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

FIG. **1** illustrates an exemplary system for monitoring the location of a vehicle.

FIG. **2** illustrates a simplified exemplary chart illustrating how a correlation logic may correlate a vehicle to a communications device or the location of the vehicle to the location information of the communications device.

FIG. **3** illustrates the exemplary system for monitoring the location of a vehicle with additional details.

FIG. **4** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **6** illustrates a flow diagram for an exemplary method for receiving consent from a user to monitoring the location of a vehicle associated with the user.

FIG. **7** illustrates a flow diagram for an exemplary method for receiving from a user a revocation of consent to monitoring the location of a vehicle associated with the user.

FIG. **8** illustrates an exemplary user interface for use in conjunction with a system for monitoring the location of a vehicle.

FIG. **9** illustrates an application programming interface (API) providing access to a system for monitoring the location of a vehicle.

FIG. **10** illustrates a computer where systems or methods for monitoring the location of a vehicle may be implemented.

DETAILED DESCRIPTION

Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

In the present disclosure, embodiments are described in the context of location of freight hauling vehicles. It will be appreciated, however, that the exemplary context of freight hauling vehicles is not the only operational environment in which aspects of the disclosed systems and methods may be used. Therefore, the techniques described in this disclosure may be applied to many types of apparatus, vehicles or devices whose location information may be of interest.

FIG. **1** illustrates an exemplary system **100** for monitoring the location of a vehicle **105**, which has a communication device **110** within the vehicle **105**. The system **100** includes a communications interface **120** that communicates with devices external to the system **100** via electronic signals. For example, the communications logic **120** is configured to communicate with a location information provider **150**, a requesting party **160**, and a receiving party **165**.

The location information provider **150** corresponds to a party or device other than the vehicle **105** and the device **110**. The location information provider **150** has access to location of the vehicle **105** or the device **110**. In one embodiment, the location information provider **150** is a wireless service provider that provides wireless service in a network **155**. In another embodiment, the location information provider **150** is a third party or device that receives the location information of the device **110** from the wireless service provider or from some other party or device. In yet another embodiment, the location information provider **150** is a party other than a wireless service provider or a third party. For example, the party seeking to monitor the location of the vehicle **105**, the requesting party **160**, may have access to the location information of the device **110**. In that case, the requesting party **160** may also be the location information provider **150**. In another example, the party operating the system **100** may have access to the location information of the device **110**.

The requesting party **160** corresponds to a party or device interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. The receiving party **165** corresponds to a party or device who receives the location of the vehicle **105** from the system **100** to monitor the location of the vehicle **105**. In an example involving freight hauling services providers or freight carriers, a carrier who is interested in monitoring the location of its own vehicles, vehicles under contract, or other vehicles requests the ability to monitor the location of the vehicle **105** for its own consumption. In this case, the carrier is both the requesting party **160** and the receiving party **165**. In another example, the requesting party **160** may be a driver interested in sharing the location of his/her vehicle **105** with a carrier to allow the carrier to monitor the location of the vehicle **105**. In this case, the driver is the requesting party **160** and the carrier is the receiving party **165**. In one embodiment, multiple parties or devices may be interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. In that case, the communications

interface **120** is configured to communicate with multiple requesting parties and/or multiple receiving parties.

The system **100** further includes a correlation logic **170** that correlates the vehicle **105** and the device **110**. In one embodiment, the correlation logic **170** correlates the vehicle **105** and the device **110** based at least in part on the vehicle **105** being associated with at least one user who is also associated with the device **110**. For example, the user may be associated with the vehicle **105** because the user is the designated driver of the vehicle **105** and the user may be associated with the communications device **110** because the user is under contract with a wireless service provider for the provider to provide wireless service to the communications device **110**. In another example, the user is associated with the vehicle **105**, with the device **110**, or with both in a database or in the correlation logic **170**. In another embodiment, the vehicle **105** is directly associated with the communications device **110** without a user being associated with the vehicle **105** or with the device **110**.

In an example of the operation of the system **100**, the requesting party **160** transmits and the communications interface **120** receives data representing a request from the requesting party **160** for the ability to monitor the location of the vehicle **105**. In response to the request from the requesting party **160**, the correlation logic **170** correlates the vehicle **105** to the device **110**. The communications interface **120** transmits to the location information provider **150** data representing one or more requests for location information of the device **110**. In response to a request for location information of the device **110**, the location information provider **150** transmits and the communications interface **120** receives data representing the location information of the device **110**. The correlation logic **170** correlates the location information of the device **110** to the location of the vehicle **105**.

With the location of the vehicle **105** on hand, the communication interface **120** can transmit data representing the location of the vehicle **105** to the receiving party **165** through computer communication. The location of the vehicle **105** may then be displayed in a user interface (not shown). In another embodiment, the communications interface **120** is configured to communicate the location to the receiving party **165** by exposing an application programming interface (API) through which the receiving party **165** can access the location of the vehicle **105**. The receiving party **165** can make use of the API to make the information available to its enterprise software (e.g., SAP, Oracle, etc.) for example.

FIG. **2** illustrates a simplified exemplary chart **200** illustrating how the correlation logic **170** may correlate the vehicle **105** to the device **110** or the location of the vehicle **105** to the location information of the device **110**. In the illustrated embodiment, for each vehicle **105***a-g* registered in the system **100**, the correlation logic **170** has data fields corresponding to each vehicle **105***a-g*. The data fields include information regarding the vehicles **105***a-g*. Potential information that may be included in the data fields include one or more drivers **210***a-b* associated with each of the vehicles **105***a-g* and one or more devices **110***a-b* associated with each of the drivers **210***a-b*, respectively. The drivers **210***a-b* are identified by name while the devices **110***a-b* are identified by an identifier, which in this case corresponds to a telephone number associated with the respective device **110***a-b*.

In other embodiments, the identifier corresponds to a number or some other identifying information associated with the device **110** other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

Additional information that may be included in the data fields include the capacity of a vehicle **105***a-g* (e.g., total volumetric and weight capacity **220**, available volumetric and weight capacity **230**, etc.), whether the container is refrigerated Ref., and so on.

In the illustrated embodiment, the vehicle **105***a* is associated with an active driver **210***a* named Bianchi Campagnolo who is associated with an active device **110***a* identified by an identifier corresponding to the telephone number (143) 846-5405. The vehicle **105***a* may also be associated with a backup driver named Bob Haro who is associated with a backup device **110***b* identified by an identifier corresponding to the telephone number (443) 240-5465. The correlation logic **170** correlates the vehicle **105** with the active driver **210***a* unless the correlation logic **170** is instructed to instead use the backup driver **210***b*. In that case, the active driver **210***a* and the backup driver **210***b* may switch, with the name listed under backup driver **210***b* appearing under active driver **210***a* and viceversa. Similarly, the correlation logic **170** correlates the vehicle **105** with the active device **110***a* unless the correlation logic **170** is instructed to instead use the backup device **110***b*. In that case, the active device **110***a* and the backup device **110***b* may switch, with the identifier listed under backup device **110***b* appearing under active device **110***a* and viceversa. In this way, the correlation logic **170** can transform the location information of the communications device **110** into information regarding the location of the vehicle **105** by correlating the location information of the communications device **110** to the location of the vehicle **105** based at least in part on the communications device **110** being associated with the user who is associated with the vehicle **105**. In one embodiment, the correlation logic **170** correlates the vehicle **105** with the active driver **210***a* and the backup driver **210***b*.

In the illustrated embodiment, the vehicle **105***a* has a total capacity of 4,013 pounds and 42,660 cubic feet of which 4,013 pounds and 42,660 cubic feet are currently available. The vehicle **105***c* has a total capacity of 2,878 pounds and 36,280 cubic feet. The capacity of the vehicle **105***c* is refrigerated capacity. However, none of that capacity is currently available (e.g., the container associated with the vehicle **105***c* is full) since the available capacity is indicated as 0 pounds and 0 cubic feet.

FIG. **3** illustrates the exemplary system **100** for monitoring the location of a vehicle **105** with additional details.

As described above, the system **100** receives the location information of the device **110** from a location information provider **150**, which is a party or device other than the device **110**. The location information provider **150** may be a wireless service provider or a party or device that receives the location information from a wireless service provider. Examples of wireless service providers in the United States include Verizon Wireless, AT&T Mobility, Sprint Nextel, T-Mobile, etc. These wireless service providers have technologies deployed that allow them to approximate the location of devices in their network. Some of these technologies were developed and deployed in compliance with E911, a government mandate requiring the wireless service providers to provide the approximate location of a mobile device in case of an emergency.

Location of devices in a cellular network may be described as involving two general positioning techniques: 1) techniques that require the device to incorporate a global posi-

tioning system (GPS) receiver, and 2) techniques that use some form of radiolocation from the device's network and do not require the device to incorporate a GPS receiver.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a radiolocation technique where the approximated location of the device **110** corresponds to a range of locations corresponding to a transmission range of a single radio tower **155**. In an example of this technology, each radio tower is assigned a unique identification number, a Cell-ID. The Cell-ID is received by all mobile devices in the coverage area of the radio tower **155**, thus the position of the device **110** in the coverage area of the radio tower **155** is derived from the coordinates of the radio tower **155**. Additional techniques, such as measuring signal strength of the device **110** could be used to increase the accuracy of the location information. Accuracy can be further enhanced by including a measurement of Timing Advance (TA) in GSM/GPRS networks or Round Trip Time (RTT) in UMTS networks. TA and RTT use time offset information sent from the radio tower **155** to adjust the communications device's relative transmit time to correctly align the time at which the communications device's signal arrives at the radio tower **155**. These measurements can be used to determine the distance from the communications device to the radio tower **155**, further improving accuracy.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part using triangulation between multiple radio towers such as tower **155**. The location of the device **110** may be determined by using one or a combination of several techniques including the following:

Angle of Arrival (AOA)—This technique requires at least two radio towers and locates the device **110** at the point where the lines along the angles from each tower intersect.

Time Difference of Arrival (TDOA)—This technique also requires at least two radio towers and determines the time difference between the time of arrival of a signal from the device **110** to the first tower **155**, to a second tower, and so on.

Advanced Forward Link Trilateration (AFLT)—In this technique the communications device measures signals from nearby towers such as radio tower **155**, which are then used to triangulate an approximate location of the device **110**.

Enhanced-observed time difference (E-OTD)—This technique takes data received from the nearby towers such as radio tower **155** to measure the difference in time it takes for the data to reach the device **110**. The time difference is used to calculate where the device **110** is in relation to the radio towers.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique not requiring a GPS satellite receiver to form part of the device **110**. In another embodiment the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a hybrid method including a technique requiring a GPS satellite receiver to form part of the device **110** and a technique not requiring a GPS satellite receiver to form part of the device **110**. In yet another embodiment, the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique requiring a GPS satellite receiver to form part of the device **110**.

However, since the system **100** obtains the location information from the location information provider **150** and not from the device **110**, the system **100** can be operated to monitor the location of devices incorporating a GPS satellite receiver as well as devices not incorporating a GPS satellite receiver. Thus, the system **100** does not rely on any particular positioning technology for obtaining the location of the vehicle **105**.

In continued reference to FIG. **3**, the system **100** provides user notification and receives user consent to the monitoring the location of the vehicle **105**. In this embodiment, the communications interface **120** is further configured for communication with the device **110**. In one embodiment, the communication interface **120** is associated with a toll free number such as a 1-800 number. The driver of the vehicle **105** may initiate a telephone call by dialing the toll free number. In another embodiment, the communications interface is associated with a number other than a toll free number. In yet another embodiment, the communications interface **120** is configured to initiate the telephone call.

In one embodiment, the system **100** further includes a validation logic **130** that is configured to identify the device **110** at least in part by obtaining the identifier associated with the device **110**. Obtaining the identifier associated with the device **110** ensures that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) is notified that location of the vehicle **105** will be monitored and that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) consents to the monitoring of the location. In one embodiment, the identifier is a telephone number associated with the device **110**. In one embodiment, where the communications interface **120** is associated with a toll free number as discussed above, the validation logic **130** is configured to identify the device **110** at least in part by obtaining the telephone number associated with the device **110** via automatic number identification (ANI). As discussed above in reference to FIG. **2**, in other embodiments, the identifier may be an identifier other than a telephone number.

The system **100** further includes a notification logic **140** that is configured to communicate a signal including data representing an automated voice message. In one embodiment, the automated voice message provides a notice that includes information indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. In another embodiment, the automated voice message provides a location (web address, etc.) where the notice may be found indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. For example, the automated voice message may indicate that the notice may be found at a web address and provide the web address.

The communications interface **120** is configured to transmit the automated voice message to the device **110**. The communications interface **120** is further configured to receive from the device **110** data indicating the user consent to monitoring of the location of the vehicle **105**.

In one embodiment, the automated voice message communicates that user's consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate your consent to revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive

data indicating that an action was performed on the device **110**, which indicates the user's consent (e.g., the user pressed 1).

In another embodiment, the automated voice message communicates that the user's consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your consent to revealing your location, please say 'yes.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's consent (e.g., the user said "yes").

In one embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** and receives the location information of the communications device **110**. The request for the location information of the device **110** includes the identifier associated with the device **110**.

In the illustrated embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** to a location information provider **150** and receives the location information of the communications device **110** from the location information provider **150**.

In one embodiment, the notification logic **140** is further configured to communicate a signal including data representing a second automated voice message indicating that consent to the monitoring of the location of the vehicle **105** is revocable via the device **110**. In this embodiment, the communications interface **120** is configured to communicate to the device **110** the second automated voice message and to receive confirmation of consent or revocation of consent to the monitoring of the location of the vehicle **105** from the device **110**.

In one embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate that you wish to revoke consent to revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive data indicating that an action was performed on the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user pressed 1).

In another embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your confirmation of consent to revealing your location, please say 'confirmed.'") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user said "confirmed").

In one embodiment, the user is given the option to temporarily revoke consent to the disclosure of location information. For example, a driver may wish to make available his location to a carrier during certain hours during the work week, but may not want the carrier to be able to obtain the driver's location during the weekend. The driver may operate the device **110** to indicate a date and time when the driver wishes for the monitoring of the location of the vehicle **105** to end or resume. Or the driver may operate the device **110** to indicate an interval of time (e.g., 2 hours) during which the driver wishes to hide the location of the vehicle **105**. In this embodiment, the communications interface **120** is configured to receive data indicating a time until which consent to the monitoring of the location of the vehicle **105** is granted or revoked, or an interval of time during which consent to the monitoring of the location of the vehicle **105** is granted or revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "share" using the device **110**. In this embodiment, the communications interface **120** is configured to receive the text message as sent by the device **110**, which indicates the user's confirmation or revocation of consent. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle **105**, respectively. In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent.

In one embodiment, when the location of the vehicle **105** is being disclosed, the notification logic **140** is further configured to periodically generate and the communications interface **120** is further configured to periodically communicate a reminder notification message indicating that the location of the vehicle **105** is currently being disclosed. In one embodiment, the system **100** reminds the user every 30 days that the location of the vehicle **105** is currently being disclosed. In another embodiment, the system **100** reminds the user more or less often than every 30 days that the location of the vehicle **105** is currently being disclosed.

In one embodiment, the communications interface **120** reminds the user in an automated voice message that the location of the vehicle **105** is currently being disclosed. In another embodiment, the communications interface **120** reminds the user in an SMS message that the location of the vehicle **105** is currently being disclosed. In yet another embodiment, the communications interface **120** reminds the user via electronic communication other than an automated voice message or an SMS message that the location of the vehicle **105** is currently being disclosed.

Example methods may be better appreciated with reference to the flow diagrams of FIGS. **4** through **7**. While for purposes of simplicity of explanation, the illustrated methodologies are shown and described as a series of blocks, it is to be appreciated that the methodologies are not limited by the order of the blocks, as some blocks can occur in different orders or concurrently with other blocks from that shown or described. Moreover, less than all the illustrated blocks may be required to implement an example methodology. Furthermore, additional or alternative methodologies can employ additional, not illustrated blocks.

In the flow diagrams, blocks denote "processing blocks" that may be implemented with logic. The processing blocks may represent a method step or an apparatus element for performing the method step. A flow diagram does not depict syntax for any particular programming language, methodology, or style (e.g., procedural, object-oriented). Rather, a flow diagram illustrates functional information one skilled in the art may employ to develop logic to perform the illustrated processing. It will be appreciated that in some examples, program elements like temporary variables, routine loops, and so on, are not shown. It will be further appreciated that electronic and software applications may involve dynamic

and flexible processes so that the illustrated blocks can be performed in other sequences that are different from those shown or that blocks may be combined or separated into multiple components. It will be appreciated that the processes may be implemented using various programming approaches like machine language, procedural, object oriented or artificial intelligence techniques.

In one example, methodologies are implemented as processor executable instructions or operations provided on a computer-readable medium. Thus, in one example, a computer-readable medium may store processor executable instructions operable to perform the methods of FIGS. **4** through **7**.

While FIGS. **4** through **7** illustrate various actions occurring in serial, it is to be appreciated that various actions illustrated in FIGS. **4** through **7** could occur substantially in parallel. While a number of processes are described, it is to be appreciated that a greater or lesser number of processes could be employed and that lightweight processes, regular processes, threads, and other approaches could be employed. It is to be appreciated that other example methods may, in some cases, also include actions that occur substantially in parallel.

FIG. **4** illustrates a flow diagram for an exemplary method **400** for monitoring location of a vehicle. At **410**, the method **400** includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle. At **420**, the method **400** includes correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle. At **430**, the method **400** includes transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. In one embodiment, the second electronic signal includes data representing a telephone number associated with the communications device.

At **440**, the method **400** includes receiving a third electronic signal from the location information provider including data representing the location information of the communications device. At **450**, the method **400** includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle. At **460**, the method **400** includes transmitting a fourth electronic signal including data representing the location of the vehicle. In one embodiment, the transmitting the fourth electronic signal including data representing the location of the vehicle includes exposing an application programming interface (API) from which the requesting party can access the location of the vehicle.

In one embodiment, the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device. In one embodiment, the location information of the communications device is originally obtained using a method including at least one of: advance forward link trilateration (AFLT), observed time difference (OTD), Cell-ID (CID), and obtaining a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the user of the communications device is a driver of the vehicle. In one embodiment, the location information provider corresponds to one of: a wireless service provider providing wireless service to the communications device or a third party that obtains the location information from the wireless service provider providing wireless service to the communications device. In one embodiment, the requesting party corresponds to one of: a freight service provider wherein the location of the vehicle is transmitted to the freight service provider for the freight service provider to have access to location of freight carried by the vehicle, or the driver of the vehicle requesting that the location of the vehicle be transmitted to a freight service provider for the freight service provider to have access to location of freight carried by the vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method **500** for monitoring location of a vehicle. At **510**, the method **500** includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device. The communications device is associated with a user of the communications device who is also associated with the vehicle. At **520**, the method **500** includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device.

At **530**, the method **500** includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle.

In one embodiment, the location information of the communications device is originally obtained by a wireless service provider providing wireless service to the communications device. In one embodiment, the location information of the communications device includes location information obtained in compliance with E911. In one embodiment, the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. In one embodiment, the location information of the communications device is originally obtained through triangulation between radio towers. In one embodiment, the location information of the communications device is originally obtained using a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the location signal is received from one of: a wireless service provider, or a third party who receives the location information from the wireless service provider.

FIG. **6** illustrates a flow diagram for an exemplary method **600** for receiving consent from a user for monitoring the location of a vehicle associated with the user. At **610**, the method **600** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user of the communications device initiates the telephone call. In another embodiment, the user of the communications device receives the telephone call. At **620**, the method **600** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the communications device user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI).

In other embodiments, the identifier is an identifier other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a

Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

At **630**, the method **600** includes transmitting to the communications device a signal including data representing an automated voice message. The automated voice message communicates to the user of the communications device at least one of: (a) a notice including information indicating that consenting to the monitoring of the location of the vehicle would result in the location of the vehicle or the location of the communications device being disclosed, or (b) a location at which to find the notice. At **640**, the method **600** includes receiving from the user via the communications device consent for monitoring the location of the vehicle.

In one embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, once consent has been obtained from the user of the communications device, the method **600** includes periodically communicating to the user via the communications device a notification message indicating that the location is being disclosed.

In one embodiment, after receiving from the user consent for monitoring the location of the vehicle, the method **600** includes transmitting a request for the location information of the communications device and receiving the location information of the communications device.

In one embodiment, after receiving the location information of the communications device, the method **600** includes communicating the location of the vehicle to a receiving party. In one embodiment, communicating the location of the vehicle to a receiving party includes: (a) transmitting the communicating the location of the vehicle to the receiving party through computer communication, or (b) exposing an application programming interface (API) from which the receiving party can access the location of the vehicle.

FIG. **7** illustrates a flow diagram for an exemplary method **700** for receiving from a user a revocation of consent for monitoring the location of a vehicle associated with the user. At **710**, the method **700** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user initiates the telephone call. In another embodiment, the user receives the telephone call. At **720**, the method **700** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI). In other embodiments, the identifier is an identifier other than a telephone number as discussed above in reference to method **600**.

At **730**, the method **700** includes communicating to the user via an automated voice message transmitted to the communications device information indicating that consent to the monitoring of the location of the vehicle associated with the user is revocable via the communications device. At **740**, the method **700** includes receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle associated with the user.

In one embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, the revocation of consent is temporary, and the receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle includes receiving data indicating (a) a time at which consent to the monitoring of the location of the vehicle is revoked, (b) a time until which the consent to the monitoring of the location of the vehicle is revoked, or (c) an interval of time during which the consent to the monitoring of the location of the vehicle is revoked. Consent is revoked at the time indicated or at the beginning of the indicated interval of time. Consent is unrevoked at the indicated time until which the consent to the monitoring of the location of the vehicle is revoked or upon expiration of the indicated interval of time during which the consent to the monitoring of the location of the vehicle is revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "share" using the device **110**. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively. In one embodiment, words other than "hide" or "share" may be used to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively.

FIG. **8** illustrates an exemplary user interface **800** for use in conjunction with a system for monitoring of the location of the vehicle. The user interface **800** is operable by the requesting party or the receiving party to set up monitoring of the location of the vehicle, display information regarding monitoring of the location of the vehicle, and display location of the vehicle.

In the illustrated embodiment, the user interface **800** displays Start/End Monitoring buttons **810***a-g* operable by a user to end or start monitoring of the location of the vehicle. The user interface **800** further displays the Telephone Number corresponding to the communications device associated with a user associated with the vehicle. The user interface **800** further displays the Monitoring Term, which corresponds to the total amount of time (e.g., 2 hours) that the location of the associated vehicle will be monitored. The user interface **800** further displays the Monitoring Interval, which corresponds to how often within the Monitoring Term (e.g., every 15 minutes) the location of the vehicle is updated. In the illustrated embodiment, the user interface **800** displays the Location as latitude and longitude coordinates. In another embodiment, the user interface **800** displays the Location in a format other than latitude and longitude coordinates. In one embodi-

ment, a user may click on Location to display a map that includes a mark indicating the location of the vehicle on the map.

In one embodiment, an operator of a system for monitoring location of a vehicle or some other party who provides vehicle location monitoring services to a user charges fees to the user on a per-load basis or a per-time-monitored basis. A common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This is, at least in part, due to limitations of conventional systems for monitoring vehicle location. The systems and methods for monitoring location of a vehicle disclosed herein provide the provider of vehicle location monitoring services with the ability to charge for the services on a per-load basis or a per-time-monitored basis. For example, a user may operate the user interface **800** or any other means to interface with the system for monitoring location of vehicles to set a time to start or end monitoring of the location of five vehicles (e.g., Start/End Monitoring buttons **810***a-g*).

In one embodiment where the provider of vehicle location monitoring services provides its services on a per-load or a per-time-monitored basis at a set or negotiated rate per load per unit time, the system may keep track of the number of vehicles (i.e., five) whose location is monitored, as well as the total amount of time for which vehicles' location is monitored (i.e., total time×5 vehicles×rate). The operator may use the Monitoring Term to establish the total amount of time (e.g., 2 hours) or the Monitoring Interval to establish the frequency within the Monitoring Term (e.g., every 15 minutes) that the location of the vehicle or vehicles is monitored. With this information available to the operator's billing system, the operator can charge fees to the user on a per-load basis or a per-time-monitored basis.

In the illustrated embodiment, the user interface displays a Partner/Code. The Partner/Code field may display a code corresponding to a partner company or driver. For example, a carrier A may subcontract with another carrier NAT to move freight from location **1** to location **2**. The user interface displays the carrier NAT associated with the Telephone Number 555-555-5555.

The user interface **800** further displays a Reference Number. In one embodiment, the Reference Number field is a customizable field that carriers can use to identify a particular load, a particular vehicle, a particular order, etc. In one embodiment, the Reference Number appears in invoices and other documents to facilitate efficient system administration.

The user interface **800** further displays the Status of the vehicle. For example, the Status may indicate that the system is Monitoring the vehicle. In another example, the Status may display that the vehicle is Hidden to indicate that the user associated with the vehicle has temporarily revoked consent to monitoring of the vehicle's location. Other possible Status indicators include: (a) Ready to monitor, which indicates that the monitoring of the location of the vehicle is setup and the system is awaiting location information data, (b) Expired, which indicates that the Monitoring Term has expired, and (c) Denied, which indicates that the user denied consent to monitoring the location of the vehicle.

In one embodiment, the user interface **800** is used to add vehicles whose location is to be monitored. A user may use field **820** to enter the identifier corresponding to the communications device associated with the vehicle whose location is to be monitored. In one embodiment (not illustrated), the user interface **800** provides a pull-down menu from which the user may chose an identifier. The user may further enter the Monitoring Term in field **830**, the Monitoring Interval in field **840**, the Partner/Code in field **850** and the Reference Number in field **860**. In one embodiment (not illustrated), the user interface **800** provides each of these fields as pull-down menus.

In some cases, the requesting party may not know the identifier corresponding to the vehicle or the user may know the identifier but not have authorization to monitoring the location of the vehicle associated with the identifier. In one embodiment (not shown), the user may enter a Partner/Code that serves as verification that the user has obtained authorization from the partner to monitor location of the vehicle associated with the identifier. This feature may also serve to keep the user from learning the identifier in cases where the user associated with the vehicle, the partner, or some other party desires not to reveal the identifier to the requesting party.

In one embodiment, the user associated with the vehicle (e.g., driver) may enter the Partner/Code. For example, the user associated with the vehicle may be an independent driver who wishes for the location information of his vehicle to be monitored by a carrier so that the carrier may assign freight for the driver to haul. However, the carrier may not want every driver in the field to do this freely because of the potential costs associated with monitoring the location of a large number of vehicles. The carrier may require the driver to enter a Partner/Code obtained from the carrier that serves as verification that the driver has obtained authorization from the carrier for the location of the driver's vehicle to be monitored by the carrier.

Referring now to FIG. **9**, an application programming interface (API) **900** is illustrated providing access to a system **910** for monitoring location of a vehicle to a receiving party. The API **900** can be employed, for example, by a programmer **920** or a process **930** to gain access to processing performed by the system **910**. For example, a programmer **920** can write a program to access the system **910** (e.g., invoke its operation, obtain its operation, set up its operation, monitor location of a vehicle) where writing the program is facilitated by the presence of the API **900**. Rather than programmer **920** having to understand the internals of the system **910**, the programmer **920** merely has to learn the interface to the system **910**. This facilitates encapsulating the functionality of the system **910** while exposing that functionality.

Similarly, the API **900** can be employed to provide data values to the system **910** or retrieve data values from the system **910**. For example, a process **930** that processes location of a vehicle can provide an identifier to the system **910** via the API **900** by, for example, using a call provided in the API **900**. Thus, in one example of the API **900**, a set of application programming interfaces can be stored on a computer-readable medium. The interfaces can be employed by a programmer, computer component, logic, and so on, to gain access to a system **910** for monitoring location of a vehicle.

FIG. **10** illustrates a computer **1000** that includes a processor **1002**, a memory **1004**, and I/O Ports **1010** operably connected by a bus **1008**. In one example, the computer **1000** may include a validation logic **1030** configured to facilitate validation of a communications device. Thus, the validation logic **1030**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for identifying the communications device at least in part by obtaining an identifier associated with the communications device. In another example, the computer **1000** may include a notification logic **1040** configured to provide notification to the user associated with a vehicle. Thus, the notification logic **1040**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for communicating a signal including data representing automated voice messages that provide

notices or directs the user of the communications device to notices that include information indicating (a) that consenting to the monitoring of the vehicle will result in the location information of the vehicle or the communications device being disclosed, (b) that the user may revoke notice by operation of the communications device, and so on. In yet another example, the computer **1000** may include a correlation logic **1070** configured to correlate a vehicle to a communications device or the location information of a communications device to the location of a vehicle based at least in part on the communications device being associated with a user of the communications device who is associated with the vehicle. Thus, the correlation logic **1070**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for correlating a vehicle to a communications device based at least in part on the communications device being associated with the user who is associated with the vehicle, means for correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, or means for transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle. The validation logic **1030**, the notification logic **1040**, or the correlation logic **1070** may be permanently or removably attached to the computer **1000**.

The processor **1002** can be a variety of various processors including dual microprocessor and other multi-processor architectures. The memory **1004** can include volatile memory or non-volatile memory. The non-volatile memory can include, but is not limited to, ROM, PROM, EPROM, EEPROM, and the like. Volatile memory can include, for example, RAM, synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), and direct RAM bus RAM (DRRAM).

A disk **1006** may be operably connected to the computer **1000** via, for example, a communications interface (e.g., card, device) **1018** and an I/O Ports **1010**. The disk **1006** can include, but is not limited to, devices like a magnetic disk drive, a solid state disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, or a memory stick. Furthermore, the disk **1006** can include optical drives like a CD-ROM, a CD recordable drive (CD-R drive), a CD rewriteable drive (CD-RW drive), or a digital video ROM drive (DVD ROM). The memory **1004** can store processes **1014** or data **1016**, for example. The disk **1006** or memory **1004** can store an operating system that controls and allocates resources of the computer **1000**.

The bus **1008** can be a single internal bus interconnect architecture or other bus or mesh architectures. While a single bus is illustrated, it is to be appreciated that computer **1000** may communicate with various devices, logics, and peripherals using other busses that are not illustrated (e.g., PCIE, SATA, Infiniband, 1394, USB, Ethernet). The bus **1008** can be of a variety of types including, but not limited to, a memory bus or memory controller, a peripheral bus or external bus, a crossbar switch, or a local bus. The local bus can be of varieties including, but not limited to, an industrial standard architecture (ISA) bus, a microchannel architecture (MCA) bus, an extended ISA (EISA) bus, a peripheral component interconnect (PCI) bus, a universal serial (USB) bus, and a small computer systems interface (SCSI) bus.

The computer **1000** may interact with input/output devices via communications interface **1018** and I/O Ports **1010**. Input/output devices can include, but are not limited to, a keyboard, a microphone, a pointing and selection device, cameras, video cards, displays, disk **1006**, network devices **1020**, and the like. The I/O Ports **1010** can include but are not limited to, serial ports, parallel ports, and USB ports.

The computer **1000** can operate in a network environment and thus may be connected to network devices **1020** via the communications interface **1018**, or the I/O Ports **1010**. Through the network devices **1020**, the computer **1000** may interact with a network. Through the network, the computer **1000** may be logically connected to remote computers. The networks with which the computer **1000** may interact include, but are not limited to, a local area network (LAN), a wide area network (WAN), and other networks. The network devices **1020** can connect to LAN technologies including, but not limited to, fiber distributed data interface (FDDI), copper distributed data interface (CDDI), Ethernet (IEEE 802.3), token ring (IEEE 802.5), wireless computer communication (IEEE 802.11), Bluetooth (IEEE 802.15.1), Zigbee (IEEE 802.15.4) and the like. Similarly, the network devices **1020** can connect to WAN technologies including, but not limited to, point to point links, circuit switching networks like integrated services digital networks (ISDN), packet switching networks, LTE networks, GSM networks, GPRS networks, CDMA networks, and digital subscriber lines (DSL). While individual network types are described, it is to be appreciated that communications via, over, or through a network may include combinations and mixtures of communications.

DEFINITIONS

The following includes definitions of selected terms employed herein. The definitions include various examples, forms, or both of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Both singular and plural forms of terms may be within the definitions.

As used in this application, the term "computer component" refers to a computer-related entity, either hardware, firmware, software, a combination thereof, or software in execution. For example, a computer component can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and a computer. By way of illustration, both an application running on a server and the server can be computer components. One or more computer components can reside within a process or thread of execution and a computer component can be localized on one computer or distributed between two or more computers.

"Computer communication," as used herein, refers to a communication between two or more computing devices (e.g., computer, personal digital assistant, cellular telephone) and can be, for example, a network transfer, a file transfer, an applet transfer, an email, a hypertext transfer protocol (HTTP) transfer, and so on. A computer communication can occur across, for example, a wireless system (e.g., IEEE 802.11, IEEE 802.15), an Ethernet system (e.g., IEEE 802.3), a token ring system (e.g., IEEE 802.5), a local area network (LAN), a wide area network (WAN), a point-to-point system, a circuit switching system, a packet switching system, combinations thereof, and so on.

"Computer-readable medium," as used herein, refers to a medium that participates in directly or indirectly providing signals, instructions or data. A computer-readable medium may take forms, including, but not limited to, non-volatile

media, volatile media, and transmission media. Non-volatile media may include, for example, optical or magnetic disks, and so on. Volatile media may include, for example, optical or magnetic disks, dynamic memory and the like. Transmission media may include coaxial cables, copper wire, fiber optic cables, and the like. Transmission media can also take the form of electromagnetic radiation, like that generated during radio-wave and infra-red data communications, or take the form of one or more groups of signals. Common forms of a computer-readable medium include, but are not limited to, a floppy disk, a flexible disk, a hard disk, a magnetic tape, other magnetic media, a CD-ROM, other optical media, punch cards, paper tape, other physical media with patterns of holes, a RAM, a ROM, an EPROM, a FLASH-EPROM, or other memory chip or card, a memory stick, a carrier wave/pulse, and other media from which a computer, a processor or other electronic device can read. Signals used to propagate instructions or other software over a network, like the Internet, can be considered a "computer-readable medium."

"Data store," as used herein, refers to a physical or logical entity that can store data. A data store may be, for example, a database, a table, a file, a list, a queue, a heap, a memory, a register, and so on. A data store may reside in one logical or physical entity or may be distributed between two or more logical or physical entities.

A "logic," as used herein, includes but is not limited to hardware, firmware, software or combinations of each to perform a function(s) or an action(s), or to cause a function or action from another logic, method, or system. For example, based on a desired application or needs, a logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), a programmed logic device, a memory device containing instructions, or the like. A logic may include one or more gates, combinations of gates, or other circuit components. A logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

An "operable connection," or a connection by which entities are "operably connected," is one in which signals, physical communications, or logical communications may be sent or received. Typically, an operable connection includes a physical interface, an electrical interface, or a data interface, but it is to be noted that an operable connection may include differing combinations of these or other types of connections sufficient to allow operable control. For example, two entities can be operably connected by being able to communicate signals to each other directly or through one or more intermediate entities like a processor, operating system, a logic, software, or other entity. Logical or physical communication channels can be used to create an operable connection.

"Signal," as used herein, includes but is not limited to one or more electrical or optical signals, analog or digital signals, data, one or more computer or processor instructions, messages, a bit or bit stream, or other means that can be received, transmitted or detected.

"Software," as used herein, includes but is not limited to, one or more computer or processor instructions that can be read, interpreted, compiled, or executed and that cause a computer, processor, or other electronic device to perform functions, actions or behave in a desired manner. The instructions may be embodied in various forms like routines, algorithms, modules, methods, threads, or programs including separate applications or code from dynamically or statically linked libraries. Software may also be implemented in a variety of executable or loadable forms including, but not limited to, a stand-alone program, a function call (local or remote), a servelet, an applet, instructions stored in a memory, part of an operating system or other types of executable instructions. It will be appreciated by one of ordinary skill in the art that the form of software may depend, for example, on requirements of a desired application, the environment in which it runs, or the desires of a designer/programmer or the like. It will also be appreciated that computer-readable or executable instructions can be located in one logic or distributed between two or more communicating, co-operating, or parallel processing logics and thus can be loaded or executed in serial, parallel, massively parallel and other manners.

Suitable software for implementing the various components of the example systems and methods described herein may be produced using programming languages and tools like Java, Java Script, Java.NET, ASP.NET, VB.NET, Cocoa, Pascal, C#, C++, C, CGI, Perl, SQL, APIs, SDKs, assembly, firmware, microcode, or other languages and tools. Software, whether an entire system or a component of a system, may be embodied as an article of manufacture and maintained or provided as part of a computer-readable medium as defined previously. Another form of the software may include signals that transmit program code of the software to a recipient over a network or other communication medium. Thus, in one example, a computer-readable medium has a form of signals that represent the software/firmware as it is downloaded from a web server to a user. In another example, the computer-readable medium has a form of the software/firmware as it is maintained on the web server. Other forms may also be used.

"User," as used herein, includes but is not limited to one or more persons, software, computers or other devices, or combinations of these.

To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the detailed description or claims (e.g., A or B) it is intended to mean "A or B or both". When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995).

While example systems, methods, and so on, have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on, described herein. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention is not limited to the specific details, and illustrative examples shown or described. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims. Furthermore, the preceding description is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.

The invention claimed is:

1. A method for a machine or group of machines to monitor location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving a location request signal including data representing a request for information regarding the location of the at least one of the vehicle or the freight carried by the vehicle;

receiving a signal including data that indicates consent to transmission of location information of a communications device;

correlating, by a CPU, the at least one of the vehicle or the freight carried by the vehicle with the communications device;

transmitting a location information request signal including data representing a request for location information of the communications device to a location information provider corresponding to a party or device other than the communications device;

receiving a location information signal including data representing the location information of the communications device from the location information provider;

correlating, by the CPU or a second CPU, the location information of the communications device to the location of the at least one of the vehicle or the freight carried by the vehicle based at least in part on the correlation of the at least one of the vehicle or the freight carried by the vehicle to the communications device; and

transmitting a location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle, the location signal configured to cause a representation of the location of the vehicle or the freight carried by the vehicle.

2. The method of claim **1**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

3. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

4. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

5. The method of claim **1**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

6. The method of claim **1**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

7. The method of claim **1**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

8. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as latitude and longitude coordinates.

9. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as at city/state.

10. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on a remote device's user interface by displaying a map that includes a mark indicating the location of the vehicle on the map.

11. A machine or group of machines embodying a system for monitoring location of at least one of a vehicle or freight carried by the vehicle, the system comprising:

a logic configured to determine whether consent was given to transmit location information of a communications device;

a correlation logic configured to correlate, by a CPU, the location of the at least one of the vehicle or the freight carried by the vehicle with the location information of the communications device based at least in part on a correlation between the at least one of the vehicle or the freight carried by the vehicle and the communications device; and

a communications interface configured to communicate electronic signals including:

a location request signal received from a requesting party including data representing a request for information regarding the location of the at least one of the vehicle or the freight carried by the vehicle,

a location information request signal transmitted to a location information provider corresponding to a party or device other than the communications device including data representing a request for location information of the communications device,

a location information signal received from the location information provider including data representing the location information of the communications device, and

a location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle to cause a representation of the location of the vehicle or the freight carried by the vehicle by a remote device.

12. The system of claim **11**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless

service provider or the third party that obtains the location information of the communications device from the wireless service provider.

13. The system of claim **11**, wherein the location information of the communications device is originally obtained using a method including a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

14. The system of claim **11**, wherein the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

15. The system of claim **11**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes the communications interface exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is obtained by the requesting party.

16. The system of claim **11**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes the communications interface interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

17. The system of claim **11**, wherein the requesting party corresponds to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

18. The system of claim **11**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as latitude and longitude coordinates.

19. The system of claim **11**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as city/state.

20. The system of claim **11**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying a map that includes a mark indicating the location of the vehicle on the map.

* * * * *

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(12) **United States Patent**
Adelson

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(45) **Date of Patent: *Jul. 21, 2015**

(54) **SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Mar. 18, 2015**

Related U.S. Application Data

(63) Continuation of application No. 14/069,364, filed on Oct. 31, 2013, which is a continuation of application No. 13/613,321, filed on Sep. 13, 2012, now Pat. No. 8,604,943, which is a continuation of application No. 13/429,618, filed on Mar. 26, 2012, now Pat. No. 8,330,626.

(51) **Int. Cl.**

G08B 21/00	(2006.01)
G06Q 10/08	(2012.01)
G06Q 10/06	(2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 10/08*** (2013.01); ***G06Q 10/0631*** (2013.01)

(58) **Field of Classification Search**
CPC G06Q 10/0833; G08G 1/20; G08G 1/205
USPC 340/988–994; 701/1, 2, 32.3, 454, 467, 701/482, 485; 348/116
See application file for complete search history.

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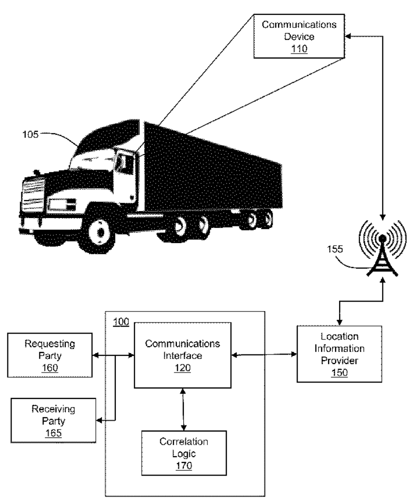
Primary Examiner — Mark Rushing
(74) *Attorney, Agent, or Firm* — Renner, Otto, Boisselle & Sklar, LLP.

(57) **ABSTRACT**

Obtaining and providing location of at least one of a vehicle or freight includes receiving a request for information regarding the location of the vehicle or the freight, the vehicle or the freight being correlated to a communications device, transmitting a request for location information of the vehicle or the freight to a location information provider, receiving an indication of consent to transmission of location information of the vehicle or the freight, receiving the location information of the vehicle or the freight correlated to the communications device from the location information provider, and transmitting the location of the vehicle or the freight.

20 Claims, 10 Drawing Sheets



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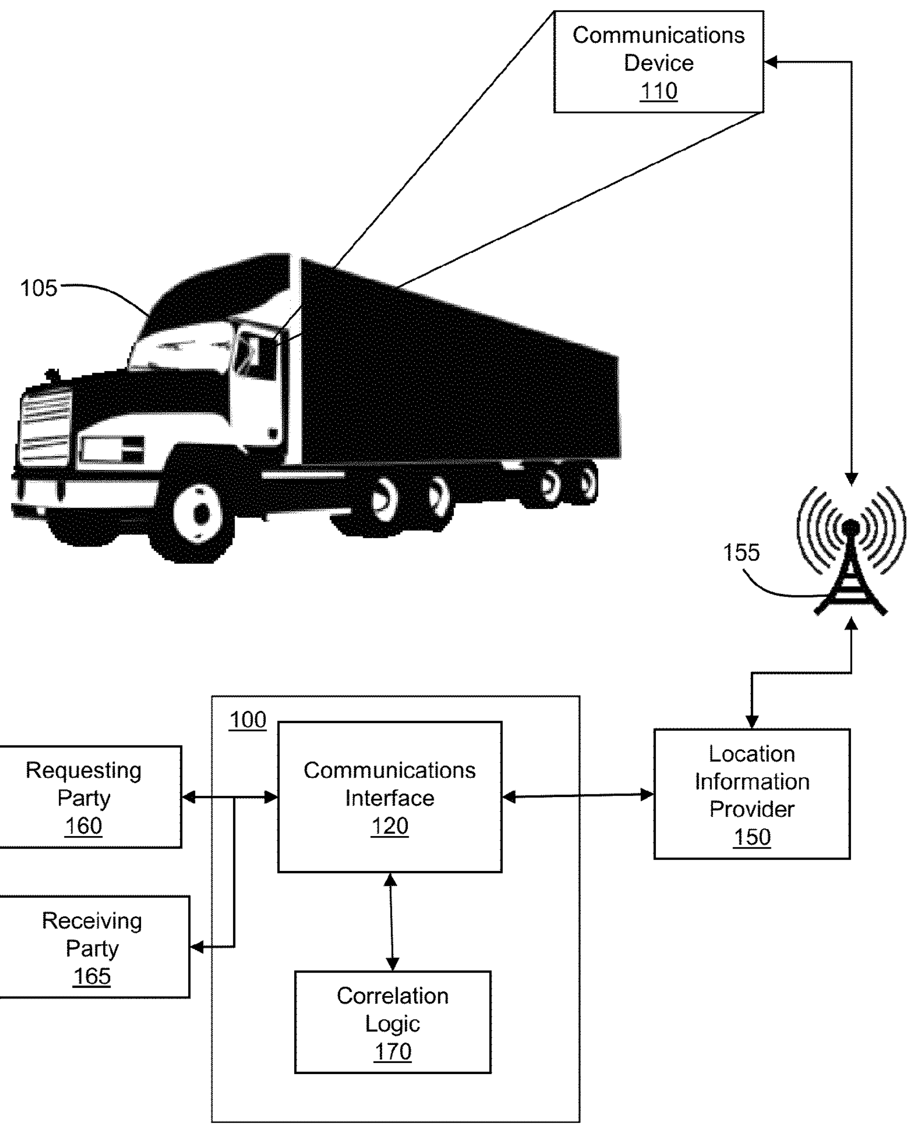
Communications Device 110
105
155
100
Requesting Party 160
Communications Interface 120
Location Information Provider 150
Receiving Party 165
Correlation Logic 170

Figure 1

200

220 230

	Active Driver <u>210a</u>	**Active Device <u>110a</u>**	**Backup Driver <u>210b</u>**	**Backup Device <u>110b</u>**	**Total Capacity ft^3 / lbs.**	**Available Capacity ft^3 / lbs.**
[redacted]						
105b	Gary Fisher	(546) 542-1235			3,931 42,010	2,531 22,010
[redacted]						
105d	Colnago Cinelli	(563) 543-5635	Ross Raleigh	(243) 546-5435	2,878 <u>Ref</u> 36,280	2,878 <u>Ref.</u> 36,280
[redacted]						
105f	Emilio Bozzi	(507) 543-5475	Murray Schwinn	(548) 243-5433	3,268 41,700	0 0
[redacted]						

Figure 2

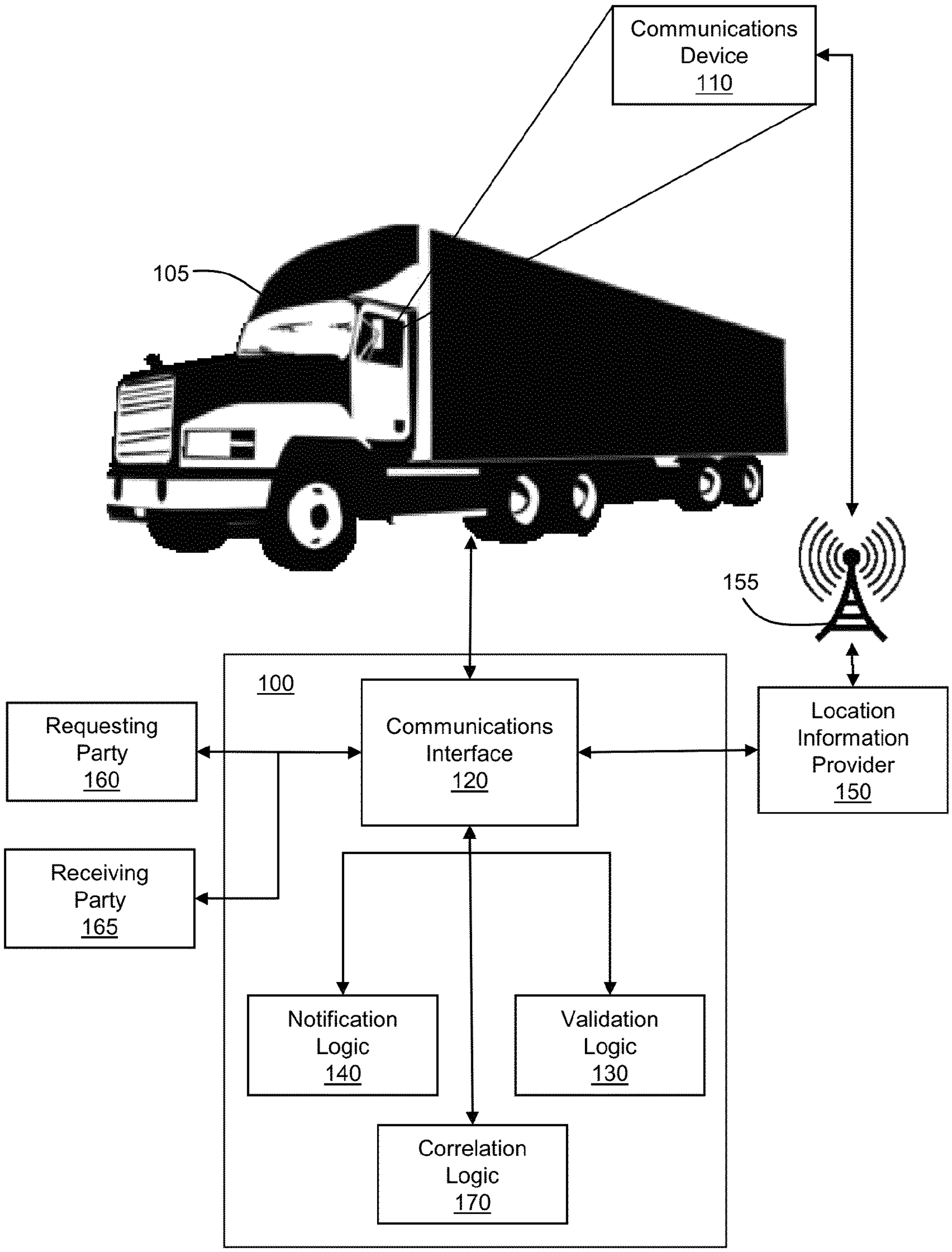
Communications
Device
110
105
155
100
Requesting
Party
160
Communications
Interface
120
Location
Information
Provider
150
Receiving
Party
165
Notification
Logic
140
Validation
Logic
130
Correlation
Logic
170

Figure 3

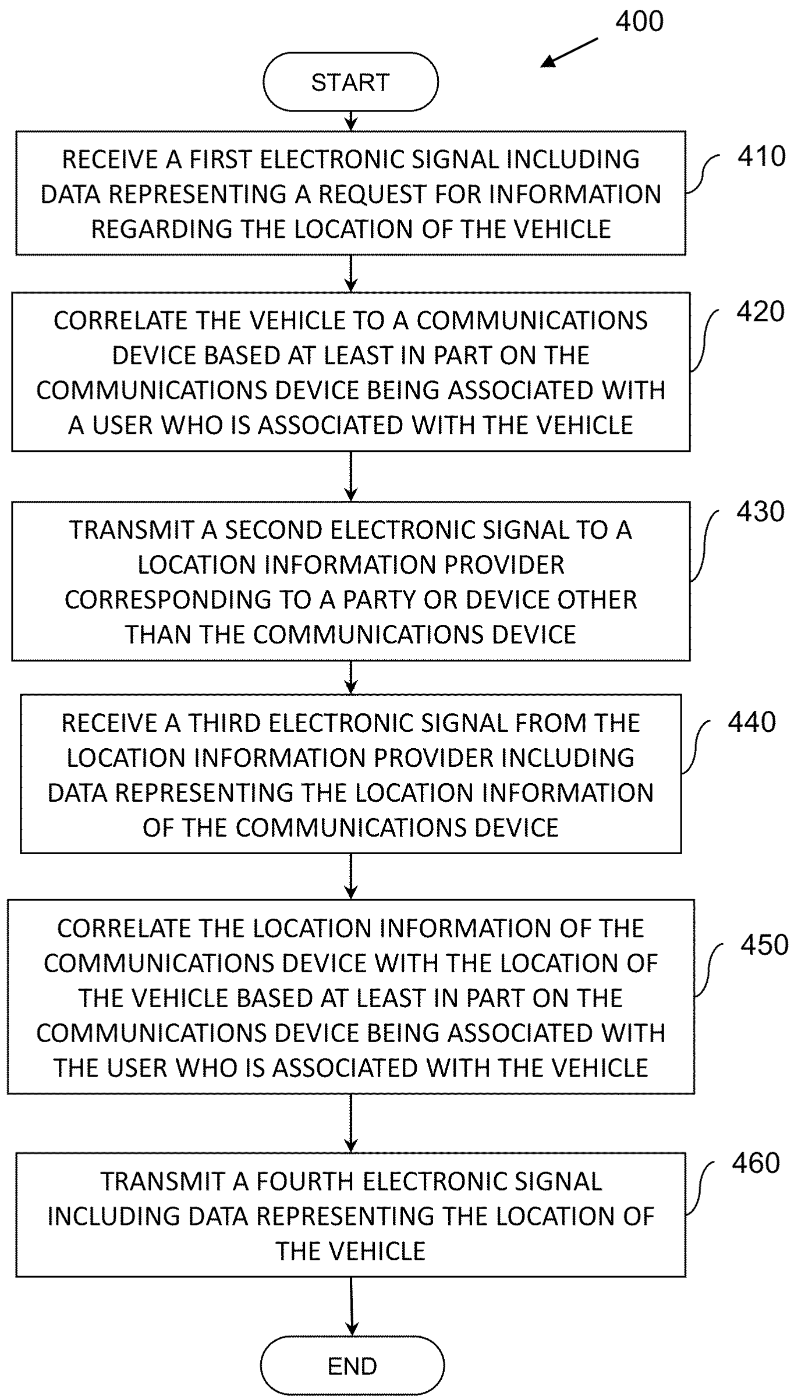
400
START
RECEIVE A FIRST ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING A REQUEST FOR INFORMATION REGARDING THE LOCATION OF THE VEHICLE
410
CORRELATE THE VEHICLE TO A COMMUNICATIONS DEVICE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH A USER WHO IS ASSOCIATED WITH THE VEHICLE
420
TRANSMIT A SECOND ELECTRONIC SIGNAL TO A LOCATION INFORMATION PROVIDER CORRESPONDING TO A PARTY OR DEVICE OTHER THAN THE COMMUNICATIONS DEVICE
430
RECEIVE A THIRD ELECTRONIC SIGNAL FROM THE LOCATION INFORMATION PROVIDER INCLUDING DATA REPRESENTING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
440
CORRELATE THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE WITH THE LOCATION OF THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER WHO IS ASSOCIATED WITH THE VEHICLE
450
TRANSMIT A FOURTH ELECTRONIC SIGNAL INCLUDING DATA REPRESENTING THE LOCATION OF THE VEHICLE
460
END

Figure 4

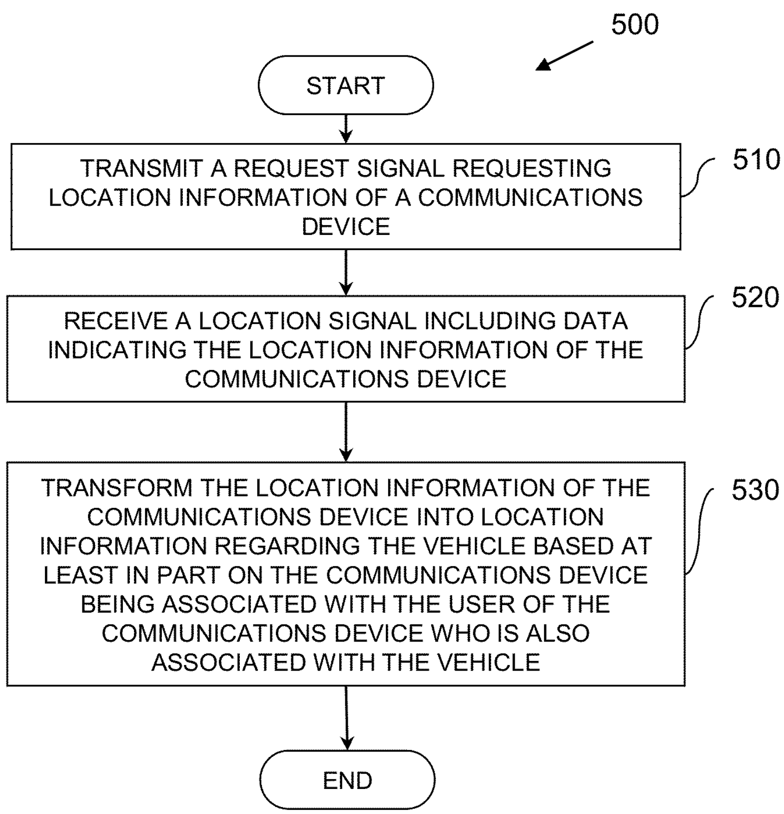
500
START
TRANSMIT A REQUEST SIGNAL REQUESTING LOCATION INFORMATION OF A COMMUNICATIONS DEVICE
510
RECEIVE A LOCATION SIGNAL INCLUDING DATA INDICATING THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE
520
TRANSFORM THE LOCATION INFORMATION OF THE COMMUNICATIONS DEVICE INTO LOCATION INFORMATION REGARDING THE VEHICLE BASED AT LEAST IN PART ON THE COMMUNICATIONS DEVICE BEING ASSOCIATED WITH THE USER OF THE COMMUNICATIONS DEVICE WHO IS ALSO ASSOCIATED WITH THE VEHICLE
530
END

Figure 5

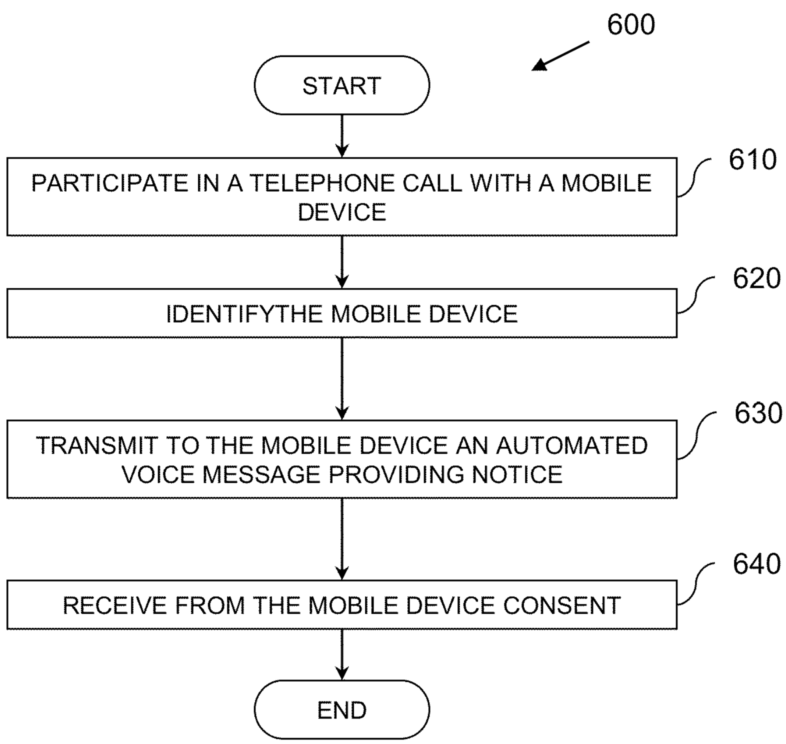
600
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
610
IDENTIFYTHE MOBILE DEVICE
620
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE PROVIDING NOTICE
630
RECEIVE FROM THE MOBILE DEVICE CONSENT
640
END

Figure 6

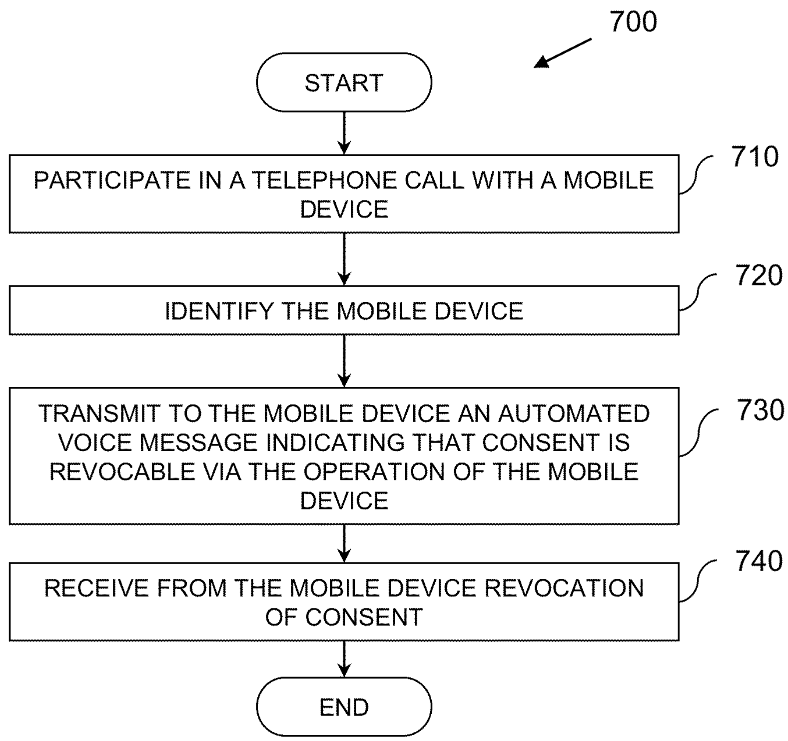
700
START
PARTICIPATE IN A TELEPHONE CALL WITH A MOBILE DEVICE
710
IDENTIFY THE MOBILE DEVICE
720
TRANSMIT TO THE MOBILE DEVICE AN AUTOMATED VOICE MESSAGE INDICATING THAT CONSENT IS REVOCABLE VIA THE OPERATION OF THE MOBILE DEVICE
730
RECEIVE FROM THE MOBILE DEVICE REVOCATION OF CONSENT
740
END

Figure 7

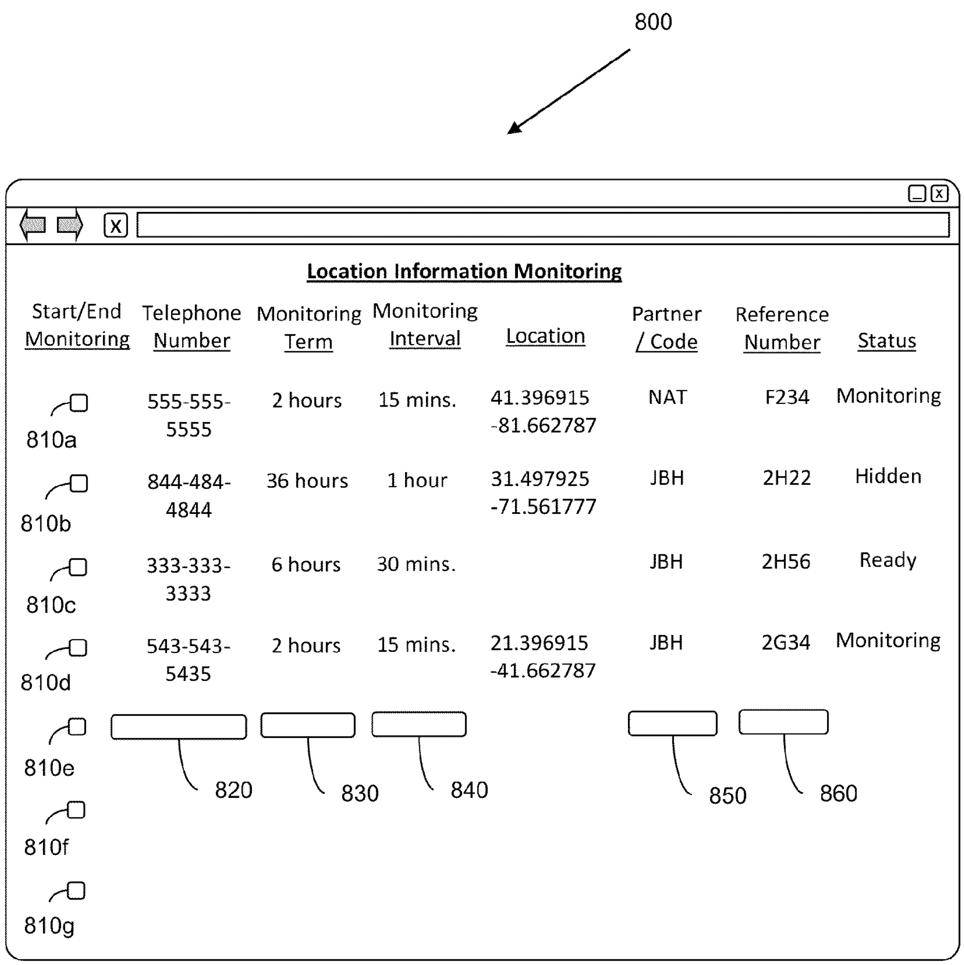
800
Location Information Monitoring
Start/End Monitoring
Telephone Number
Monitoring Term
Monitoring Interval
Location
Partner / Code
Reference Number
Status
810a
555-555-5555
2 hours
15 mins.
41.396915 -81.662787
NAT
F234
Monitoring
810b
844-484-4844
36 hours
1 hour
31.497925 -71.561777
JBH
2H22
Hidden
810c
333-333-3333
6 hours
30 mins.
JBH
2H56
Ready
810d
543-543-5435
2 hours
15 mins.
21.396915 -41.662787
JBH
2G34
Monitoring
810e
820
830
840
850
860
810f
810g

Figure 8

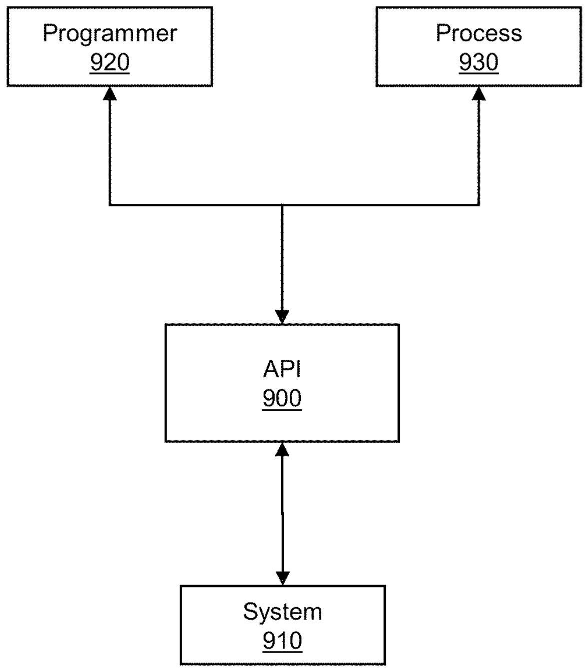

Figure 9

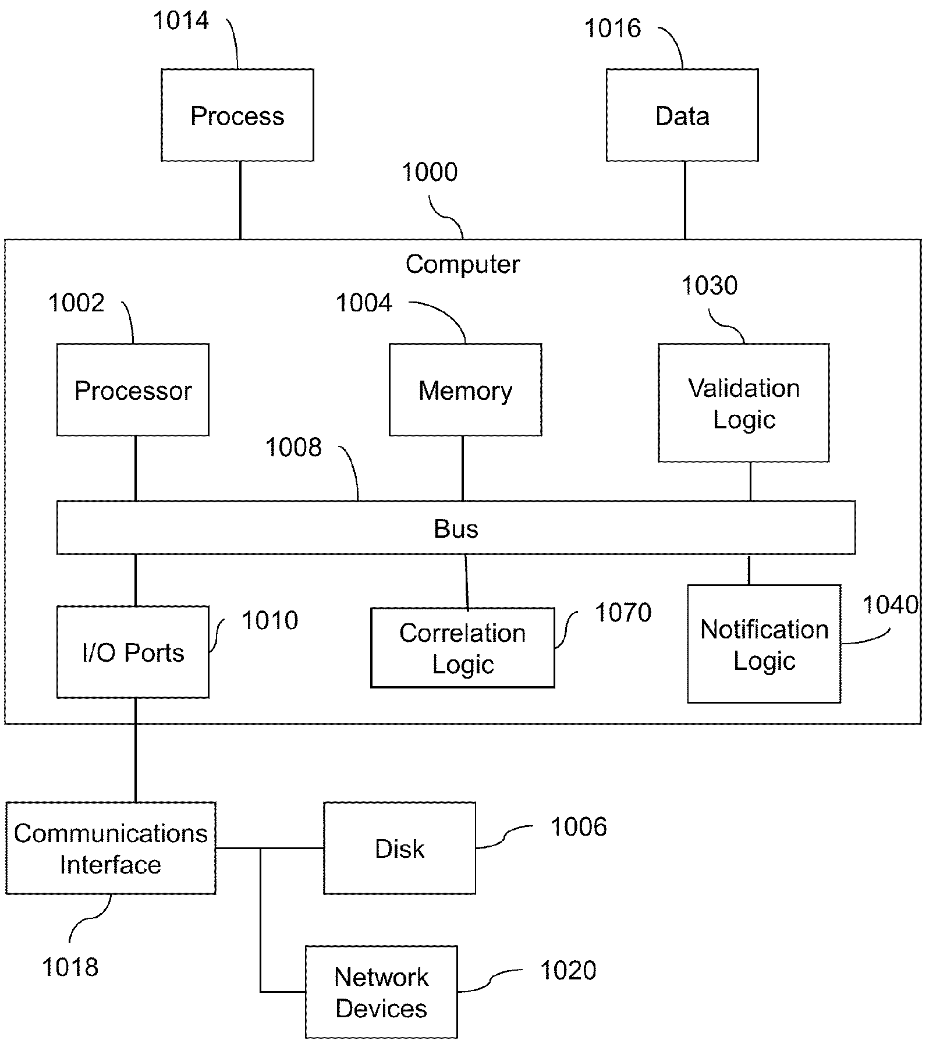
1014
1016
Process
Data
1000
Computer
1002
1004
1030
Processor
Memory
Validation Logic
1008
Bus
I/O Ports
1010
Correlation Logic
1070
Notification Logic
1040
Communications Interface
Disk
1006
1018
Network Devices
1020

Figure 10

SYSTEMS AND METHODS FOR MONITORING LOCATION OF A VEHICLE OR FREIGHT CARRIED BY A VEHICLE

TECHNICAL FIELD

The present disclosure relates to systems and methods for monitoring location.

BACKGROUND

Location information is becoming more important and prevalent.

In one example application of the use of location information, carriers, shippers, freight hauling services providers, third-party logistics service providers and courier services providers as well as other logistics and freight service providers (freight hauling) benefit from monitoring the location of vehicles in their fleets or under contract. Monitoring the location of vehicles helps improve efficiency because it allows for real-time or near real-time decision making when matching loads with vehicles. For example, by monitoring the location of fleet vehicles, a dispatcher may better understand which vehicle is the most appropriate (e.g., geographically closest, appropriate size, etc.) to send to a location for a load pickup. Conventional systems for monitoring vehicle location have relied on global positioning systems (GPS) to provide the vehicle's location. These systems require a GPS receiver to be installed in each vehicle. Moreover, some of these systems require the installation of additional dedicated equipment in each vehicle.

In addition, at least in part due to limitations of conventional systems for monitoring vehicle location, a common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This practice may represent a substantial cost to a user or organization that, for example, may wish to monitor a relatively small number of vehicles or a relatively small number of loads for a relatively short amount of time.

SUMMARY

Alternative methods for monitoring location of vehicles include radiolocation techniques including triangulation or multilateration methods that are capable of locating devices in a network. These methods involve the measurement of radio signals between a device and radio towers in the network. The technology, originally intended by telecommunication companies to approximate the location of a mobile phone in case of emergencies, provides the location of a device in the network.

The use of all of these location information technologies also raises privacy issues. A user's privacy may be at risk if location information is misused or disclosed without the authorization or knowledge of the user. To address these privacy concerns, various governmental and business organizations have developed rules and guidelines to protect user privacy. For example, the International Association for the Wireless Telecommunications Industry (CTIA) has developed Best Practices and Guidelines for Location-Based Services (the "CTIA Guidelines"), which are hereby incorporated by reference.

The Guidelines provide a framework based on two principles: user notice and consent. Users must receive "meaningful notice about how location information will be used, disclosed and protected so that users can make informed decisions . . . and . . . have control over their location information." Users must also "consent to the use or disclosure of location information" and "have the right to revoke consent . . . at any time."

Although, electronic methods have been developed that make use of web browsers and SMS texting capabilities of mobile devices to provide notification and consent, some of these systems have proved inconvenient and may require advanced mobile devices or extensive user training.

A computer implemented method for monitoring location of a vehicle includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle, correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle, and transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes receiving a third electronic signal from the location information provider. The third electronic signal includes data representing the location information of the communications device. The computer implemented method for monitoring location of a vehicle further includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, and transmitting a fourth electronic signal including data representing the location of the vehicle.

Another computer implemented method for monitoring location of a vehicle includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device and the communications device is associated with a user of the communications device who is associated with the vehicle. The computer implemented method for monitoring location of a vehicle further includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device and the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. The computer implemented method for monitoring location of a vehicle further includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

A system for monitoring location of a vehicle includes a communications interface configured to communicate electronic signals including: a first electronic signal including data representing a request for the location of the vehicle, the first electronic signal received from a requesting party, a second electronic signal including data representing a request for location information of a communications device, wherein the second electronic signal is transmitted to a location information provider corresponding to a party or device other than the communications device, wherein the communications device is associated with a user of the communications device who is associated with the vehicle, a third electronic signal including data representing the location information of the communications device, wherein the third electronic signal is received from the location information provider corresponding to the party or device other than the

communications device, and a fourth electronic signal including data representing the location of the vehicle, the fourth electronic signal transmitted to a receiving party. The system for monitoring location of a vehicle further includes a correlation logic configured to correlate the location information of the communications device to the location of the vehicle based at least in part on the communications device being associated with the user of the communications device who is associated with the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various example systems, methods, and so on, that illustrate various example embodiments of aspects of the invention. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

FIG. **1** illustrates an exemplary system for monitoring the location of a vehicle.

FIG. **2** illustrates a simplified exemplary chart illustrating how a correlation logic may correlate a vehicle to a communications device or the location of the vehicle to the location information of the communications device.

FIG. **3** illustrates the exemplary system for monitoring the location of a vehicle with additional details.

FIG. **4** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method for monitoring location of a vehicle.

FIG. **6** illustrates a flow diagram for an exemplary method for receiving consent from a user to monitoring the location of a vehicle associated with the user.

FIG. **7** illustrates a flow diagram for an exemplary method for receiving from a user a revocation of consent to monitoring the location of a vehicle associated with the user.

FIG. **8** illustrates an exemplary user interface for use in conjunction with a system for monitoring the location of a vehicle.

FIG. **9** illustrates an application programming interface (API) providing access to a system for monitoring the location of a vehicle.

FIG. **10** illustrates a computer where systems or methods for monitoring the location of a vehicle may be implemented.

DETAILED DESCRIPTION

Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

In the present disclosure, embodiments are described in the context of location of freight hauling vehicles. It will be appreciated, however, that the exemplary context of freight hauling vehicles is not the only operational environment in which aspects of the disclosed systems and methods may be used. Therefore, the techniques described in this disclosure may be applied to many types of apparatus, vehicles or devices whose location information may be of interest.

FIG. **1** illustrates an exemplary system **100** for monitoring the location of a vehicle **105**, which has a communication device **110** within the vehicle **105**. The system **100** includes a communications interface **120** that communicates with devices external to the system **100** via electronic signals. For example, the communications logic **120** is configured to communicate with a location information provider **150**, a requesting party **160**, and a receiving party **165**.

The location information provider **150** corresponds to a party or device other than the vehicle **105** and the device **110**. The location information provider **150** has access to location of the vehicle **105** or the device **110**. In one embodiment, the location information provider **150** is a wireless service provider that provides wireless service in a network **155**. In another embodiment, the location information provider **150** is a third party or device that receives the location information of the device **110** from the wireless service provider or from some other party or device. In yet another embodiment, the location information provider **150** is a party other than a wireless service provider or a third party. For example, the party seeking to monitor the location of the vehicle **105**, the requesting party **160**, may have access to the location information of the device **110**. In that case, the requesting party **160** may also be the location information provider **150**. In another example, the party operating the system **100** may have access to the location information of the device **110**.

The requesting party **160** corresponds to a party or device interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. The receiving party **165** corresponds to a party or device who receives the location of the vehicle **105** from the system **100** to monitor the location of the vehicle **105**. In an example involving freight hauling services providers or freight carriers, a carrier who is interested in monitoring the location of its own vehicles, vehicles under contract, or other vehicles requests the ability to monitor the location of the vehicle **105** for its own consumption. In this case, the carrier is both the requesting party **160** and the receiving party **165**. In another example, the requesting party **160** may be a driver interested in sharing the location of his/her vehicle **105** with a carrier to allow the carrier to monitor the location of the vehicle **105**. In this case, the driver is the requesting party **160** and the carrier is the receiving party **165**. In one embodiment, multiple parties or devices may be interested in monitoring the location of the vehicle **105** or on allowing another party to monitor the location of the vehicle **105**. In that case, the communications

interface **120** is configured to communicate with multiple requesting parties and/or multiple receiving parties.

The system **100** further includes a correlation logic **170** that correlates the vehicle **105** and the device **110**. In one embodiment, the correlation logic **170** correlates the vehicle **105** and the device **110** based at least in part on the vehicle **105** being associated with at least one user who is also associated with the device **110**. For example, the user may be associated with the vehicle **105** because the user is the designated driver of the vehicle **105** and the user may be associated with the communications device **110** because the user is under contract with a wireless service provider for the provider to provide wireless service to the communications device **110**. In another example, the user is associated with the vehicle **105**, with the device **110**, or with both in a database or in the correlation logic **170**. In another embodiment, the vehicle **105** is directly associated with the communications device **110** without a user being associated with the vehicle **105** or with the device **110**.

In an example of the operation of the system **100**, the requesting party **160** transmits and the communications interface **120** receives data representing a request from the requesting party **160** for the ability to monitor the location of the vehicle **105**. In response to the request from the requesting party **160**, the correlation logic **170** correlates the vehicle **105** to the device **110**. The communications interface **120** transmits to the location information provider **150** data representing one or more requests for location information of the device **110**. In response to a request for location information of the device **110**, the location information provider **150** transmits and the communications interface **120** receives data representing the location information of the device **110**. The correlation logic **170** correlates the location information of the device **110** to the location of the vehicle **105**.

With the location of the vehicle **105** on hand, the communication interface **120** can transmit data representing the location of the vehicle **105** to the receiving party **165** through computer communication. The location of the vehicle **105** may then be displayed in a user interface (not shown). In another embodiment, the communications interface **120** is configured to communicate the location to the receiving party **165** by exposing an application programming interface (API) through which the receiving party **165** can access the location of the vehicle **105**. The receiving party **165** can make use of the API to make the information available to its enterprise software (e.g., SAP, Oracle, etc.) for example.

FIG. **2** illustrates a simplified exemplary chart **200** illustrating how the correlation logic **170** may correlate the vehicle **105** to the device **110** or the location of the vehicle **105** to the location information of the device **110**. In the illustrated embodiment, for each vehicle **105***a-g* registered in the system **100**, the correlation logic **170** has data fields corresponding to each vehicle **105***a-g*. The data fields include information regarding the vehicles **105***a-g*. Potential information that may be included in the data fields include one or more drivers **210***a-b* associated with each of the vehicles **105***a-g* and one or more devices **110***a-b* associated with each of the drivers **210***a-b*, respectively. The drivers **210***a-b* are identified by name while the devices **110***a-b* are identified by an identifier, which in this case corresponds to a telephone number associated with the respective device **110***a-b*.

In other embodiments, the identifier corresponds to a number or some other identifying information associated with the device **110** other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

Additional information that may be included in the data fields include the capacity of a vehicle **105***a-g* (e.g., total volumetric and weight capacity **220**, available volumetric and weight capacity **230**, etc.), whether the container is refrigerated Ref., and so on.

In the illustrated embodiment, the vehicle **105***a* is associated with an active driver **210***a* named Bianchi Campagnolo who is associated with an active device **110***a* identified by an identifier corresponding to the telephone number (143) 846-5405. The vehicle **105***a* may also be associated with a backup driver named Bob Haro who is associated with a backup device **110***b* identified by an identifier corresponding to the telephone number (443) 240-5465. The correlation logic **170** correlates the vehicle **105** with the active driver **210***a* unless the correlation logic **170** is instructed to instead use the backup driver **210***b*. In that case, the active driver **210***a* and the backup driver **210***b* may switch, with the name listed under backup driver **210***b* appearing under active driver **210***a* and viceversa. Similarly, the correlation logic **170** correlates the vehicle **105** with the active device **110***a* unless the correlation logic **170** is instructed to instead use the backup device **110***b*. In that case, the active device **110***a* and the backup device **110***b* may switch, with the identifier listed under backup device **110***b* appearing under active device **110***a* and viceversa. In this way, the correlation logic **170** can transform the location information of the communications device **110** into information regarding the location of the vehicle **105** by correlating the location information of the communications device **110** to the location of the vehicle **105** based at least in part on the communications device **110** being associated with the user who is associated with the vehicle **105**. In one embodiment, the correlation logic **170** correlates the vehicle **105** with the active driver **210***a* and the backup driver **210***b*.

In the illustrated embodiment, the vehicle **105***a* has a total capacity of 4,013 pounds and 42,660 cubic feet of which 4,013 pounds and 42,660 cubic feet are currently available. The vehicle **105***c* has a total capacity of 2,878 pounds and 36,280 cubic feet. The capacity of the vehicle **105***c* is refrigerated capacity. However, none of that capacity is currently available (e.g., the container associated with the vehicle **105***c* is full) since the available capacity is indicated as 0 pounds and 0 cubic feet.

FIG. **3** illustrates the exemplary system **100** for monitoring the location of a vehicle **105** with additional details.

As described above, the system **100** receives the location information of the device **110** from a location information provider **150**, which is a party or device other than the device **110**. The location information provider **150** may be a wireless service provider or a party or device that receives the location information from a wireless service provider. Examples of wireless service providers in the United States include Verizon Wireless, AT&T Mobility, Sprint Nextel, T-Mobile, etc. These wireless service providers have technologies deployed that allow them to approximate the location of devices in their network. Some of these technologies were developed and deployed in compliance with E911, a government mandate requiring the wireless service providers to provide the approximate location of a mobile device in case of an emergency.

Location of devices in a cellular network may be described as involving two general positioning techniques: 1) techniques that require the device to incorporate a global posi-

tioning system (GPS) receiver, and 2) techniques that use some form of radiolocation from the device's network and do not require the device to incorporate a GPS receiver.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a radiolocation technique where the approximated location of the device **110** corresponds to a range of locations corresponding to a transmission range of a single radio tower **155**. In an example of this technology, each radio tower is assigned a unique identification number, a Cell-ID. The Cell-ID is received by all mobile devices in the coverage area of the radio tower **155**, thus the position of the device **110** in the coverage area of the radio tower **155** is derived from the coordinates of the radio tower **155**. Additional techniques, such as measuring signal strength of the device **110** could be used to increase the accuracy of the location information. Accuracy can be further enhanced by including a measurement of Timing Advance (TA) in GSM/GPRS networks or Round Trip Time (RTT) in UMTS networks. TA and RTT use time offset information sent from the radio tower **155** to adjust the communications device's relative transmit time to correctly align the time at which the communications device's signal arrives at the radio tower **155**. These measurements can be used to determine the distance from the communications device to the radio tower **155**, further improving accuracy.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part using triangulation between multiple radio towers such as tower **155**. The location of the device **110** may be determined by using one or a combination of several techniques including the following:

Angle of Arrival (AOA)—This technique requires at least two radio towers and locates the device **110** at the point where the lines along the angles from each tower intersect.

Time Difference of Arrival (TDOA)—This technique also requires at least two radio towers and determines the time difference between the time of arrival of a signal from the device **110** to the first tower **155**, to a second tower, and so on.

Advanced Forward Link Trilateration (AFLT)—In this technique the communications device measures signals from nearby towers such as radio tower **155**, which are then used to triangulate an approximate location of the device **110**.

Enhanced-observed time difference (E-OTD)—This technique takes data received from the nearby towers such as radio tower **155** to measure the difference in time it takes for the data to reach the device **110**. The time difference is used to calculate where the device **110** is in relation to the radio towers.

In one embodiment, the wireless service provider or another party or device originally obtaining or deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique not requiring a GPS satellite receiver to form part of the device **110**. In another embodiment the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a hybrid method including a technique requiring a GPS satellite receiver to form part of the device **110** and a technique not requiring a GPS satellite receiver to form part of the device **110**. In yet another embodiment, the wireless service provider or another party or device deriving the location information of the device **110** derives the location information of the device **110** at least in part by using a method including a technique requiring a GPS satellite receiver to form part of the device **110**.

However, since the system **100** obtains the location information from the location information provider **150** and not from the device **110**, the system **100** can be operated to monitor the location of devices incorporating a GPS satellite receiver as well as devices not incorporating a GPS satellite receiver. Thus, the system **100** does not rely on any particular positioning technology for obtaining the location of the vehicle **105**.

In continued reference to FIG. **3**, the system **100** provides user notification and receives user consent to the monitoring the location of the vehicle **105**. In this embodiment, the communications interface **120** is further configured for communication with the device **110**. In one embodiment, the communication interface **120** is associated with a toll free number such as a 1-800 number. The driver of the vehicle **105** may initiate a telephone call by dialing the toll free number. In another embodiment, the communications interface is associated with a number other than a toll free number. In yet another embodiment, the communications interface **120** is configured to initiate the telephone call.

In one embodiment, the system **100** further includes a validation logic **130** that is configured to identify the device **110** at least in part by obtaining the identifier associated with the device **110**. Obtaining the identifier associated with the device **110** ensures that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) is notified that location of the vehicle **105** will be monitored and that the correct party (e.g., the driver of the vehicle **105** or the user associated with the device **110**) consents to the monitoring of the location. In one embodiment, the identifier is a telephone number associated with the device **110**. In one embodiment, where the communications interface **120** is associated with a toll free number as discussed above, the validation logic **130** is configured to identify the device **110** at least in part by obtaining the telephone number associated with the device **110** via automatic number identification (ANI). As discussed above in reference to FIG. **2**, in other embodiments, the identifier may be an identifier other than a telephone number.

The system **100** further includes a notification logic **140** that is configured to communicate a signal including data representing an automated voice message. In one embodiment, the automated voice message provides a notice that includes information indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. In another embodiment, the automated voice message provides a location (web address, etc.) where the notice may be found indicating that consenting to the monitoring of the location of the vehicle **105** would result in the location of the vehicle **105** or the device **110** being disclosed. For example, the automated voice message may indicate that the notice may be found at a web address and provide the web address.

The communications interface **120** is configured to transmit the automated voice message to the device **110**. The communications interface **120** is further configured to receive from the device **110** data indicating the user consent to monitoring of the location of the vehicle **105**.

In one embodiment, the automated voice message communicates that user's consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate your consent to revealing your location, please press 1.") In this embodiment, the communications interface **120** is configured to receive

data indicating that an action was performed on the device **110**, which indicates the user's consent (e.g., the user pressed 1).

In another embodiment, the automated voice message communicates that the user's consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your consent to revealing your location, please say 'yes.") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's consent (e.g., the user said "yes").

In one embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** and receives the location information of the communications device **110**. The request for the location information of the device **110** includes the identifier associated with the device **110**.

In the illustrated embodiment, after receiving the user consent to the monitoring of the location of the device **105**, the communications interface **120** transmits a request for the location information of the device **110** to a location information provider **150** and receives the location information of the communications device **110** from the location information provider **150**.

In one embodiment, the notification logic **140** is further configured to communicate a signal including data representing a second automated voice message indicating that consent to the monitoring of the location of the vehicle **105** is revocable via the device **110**. In this embodiment, the communications interface **120** is configured to communicate to the device **110** the second automated voice message and to receive confirmation of consent or revocation of consent to the monitoring of the location of the vehicle **105** from the device **110**.

In one embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by performing an action on the communications device (e.g., "to indicate that you wish to revoke consent to revealing your location, please press 1." In this embodiment, the communications interface **120** is configured to receive data indicating that an action was performed on the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user pressed 1).

In another embodiment, the second automated voice message communicates that the user's confirmation of consent or the user's revocation of consent to the monitoring of the location of the vehicle **105** may be indicated by speaking a particular word or phrase to be received by the device **110** (e.g., "to indicate your confirmation of consent to revealing your location, please say 'confirmed.") In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent (e.g., the user said "confirmed").

In one embodiment, the user is given the option to temporarily revoke consent to the disclosure of location information. For example, a driver may wish to make available his location to a carrier during certain hours during the work week, but may not want the carrier to be able to obtain the driver's location during the weekend. The driver may operate the device **110** to indicate a date and time when the driver wishes for the monitoring of the location of the vehicle **105** to end or resume. Or the driver may operate the device **110** to indicate an interval of time (e.g., 2 hours) during which the driver wishes to hide the location of the vehicle **105**. In this embodiment, the communications interface **120** is configured to receive data indicating a time until which consent to the monitoring of the location of the vehicle **105** is granted or revoked, or an interval of time during which consent to the monitoring of the location of the vehicle **105** is granted or revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle **105** by texting (e.g., SMS message) the term "share" using the device **110**. In this embodiment, the communications interface **120** is configured to receive the text message as sent by the device **110**, which indicates the user's confirmation or revocation of consent. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle **105**, respectively. In this embodiment, the communications interface **120** is configured to receive a voice command from the device **110**, which indicates the user's confirmation or revocation of consent.

In one embodiment, when the location of the vehicle **105** is being disclosed, the notification logic **140** is further configured to periodically generate and the communications interface **120** is further configured to periodically communicate a reminder notification message indicating that the location of the vehicle **105** is currently being disclosed. In one embodiment, the system **100** reminds the user every 30 days that the location of the vehicle **105** is currently being disclosed. In another embodiment, the system **100** reminds the user more or less often than every 30 days that the location of the vehicle **105** is currently being disclosed.

In one embodiment, the communications interface **120** reminds the user in an automated voice message that the location of the vehicle **105** is currently being disclosed. In another embodiment, the communications interface **120** reminds the user in an SMS message that the location of the vehicle **105** is currently being disclosed. In yet another embodiment, the communications interface **120** reminds the user via electronic communication other than an automated voice message or an SMS message that the location of the vehicle **105** is currently being disclosed.

Example methods may be better appreciated with reference to the flow diagrams of FIGS. **4** through **7**. While for purposes of simplicity of explanation, the illustrated methodologies are shown and described as a series of blocks, it is to be appreciated that the methodologies are not limited by the order of the blocks, as some blocks can occur in different orders or concurrently with other blocks from that shown or described. Moreover, less than all the illustrated blocks may be required to implement an example methodology. Furthermore, additional or alternative methodologies can employ additional, not illustrated blocks.

In the flow diagrams, blocks denote "processing blocks" that may be implemented with logic. The processing blocks may represent a method step or an apparatus element for performing the method step. A flow diagram does not depict syntax for any particular programming language, methodology, or style (e.g., procedural, object-oriented). Rather, a flow diagram illustrates functional information one skilled in the art may employ to develop logic to perform the illustrated processing. It will be appreciated that in some examples, program elements like temporary variables, routine loops, and so on, are not shown. It will be further appreciated that electronic and software applications may involve dynamic

and flexible processes so that the illustrated blocks can be performed in other sequences that are different from those shown or that blocks may be combined or separated into multiple components. It will be appreciated that the processes may be implemented using various programming approaches like machine language, procedural, object oriented or artificial intelligence techniques.

In one example, methodologies are implemented as processor executable instructions or operations provided on a computer-readable medium. Thus, in one example, a computer-readable medium may store processor executable instructions operable to perform the methods of FIGS. **4** through **7**.

While FIGS. **4** through **7** illustrate various actions occurring in serial, it is to be appreciated that various actions illustrated in FIGS. **4** through **7** could occur substantially in parallel. While a number of processes are described, it is to be appreciated that a greater or lesser number of processes could be employed and that lightweight processes, regular processes, threads, and other approaches could be employed. It is to be appreciated that other example methods may, in some cases, also include actions that occur substantially in parallel.

FIG. **4** illustrates a flow diagram for an exemplary method **400** for monitoring location of a vehicle. At **410**, the method **400** includes receiving a first electronic signal including data representing a request for information regarding the location of the vehicle. At **420**, the method **400** includes correlating the vehicle to a communications device based at least in part on the communications device being associated with a user who is associated with the vehicle. At **430**, the method **400** includes transmitting a second electronic signal to a location information provider corresponding to a party or device other than the communications device. The second electronic signal includes data representing a request for location information of the communications device. In one embodiment, the second electronic signal includes data representing a telephone number associated with the communications device.

At **440**, the method **400** includes receiving a third electronic signal from the location information provider including data representing the location information of the communications device. At **450**, the method **400** includes correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle. At **460**, the method **400** includes transmitting a fourth electronic signal including data representing the location of the vehicle. In one embodiment, the transmitting the fourth electronic signal including data representing the location of the vehicle includes exposing an application programming interface (API) from which the requesting party can access the location of the vehicle.

In one embodiment, the location information of the communications device is originally obtained using a method including a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device. In one embodiment, the location information of the communications device is originally obtained using a method including at least one of: advance forward link trilateration (AFLT), observed time difference (OTD), Cell-ID (CID), and obtaining a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the user of the communications device is a driver of the vehicle. In one embodiment, the location information provider corresponds to one of: a wireless service provider providing wireless service to the communications device or a third party that obtains the location information from the wireless service provider providing wireless service to the communications device. In one embodiment, the requesting party corresponds to one of: a freight service provider wherein the location of the vehicle is transmitted to the freight service provider for the freight service provider to have access to location of freight carried by the vehicle, or the driver of the vehicle requesting that the location of the vehicle be transmitted to a freight service provider for the freight service provider to have access to location of freight carried by the vehicle.

FIG. **5** illustrates a flow diagram for an exemplary method **500** for monitoring location of a vehicle. At **510**, the method **500** includes transmitting a request signal requesting location information of a communications device. The request signal is transmitted to a party other than the communications device. The communications device is associated with a user of the communications device who is also associated with the vehicle. At **520**, the method **500** includes receiving a location signal including data indicating the location information of the communications device. The location signal is received from a party other than the communications device.

At **530**, the method **500** includes transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle.

In one embodiment, the location information of the communications device is originally obtained by a wireless service provider providing wireless service to the communications device. In one embodiment, the location information of the communications device includes location information obtained in compliance with E911. In one embodiment, the location information of the communications device is originally obtained using a method not requiring a global position system (GPS) satellite receiver to form part of the communications device. In one embodiment, the location information of the communications device is originally obtained through triangulation between radio towers. In one embodiment, the location information of the communications device is originally obtained using a range of locations corresponding to a transmission range of a single radio tower.

In one embodiment, the location signal is received from one of: a wireless service provider, or a third party who receives the location information from the wireless service provider.

FIG. **6** illustrates a flow diagram for an exemplary method **600** for receiving consent from a user for monitoring the location of a vehicle associated with the user. At **610**, the method **600** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user of the communications device initiates the telephone call. In another embodiment, the user of the communications device receives the telephone call. At **620**, the method **600** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the communications device user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI).

In other embodiments, the identifier is an identifier other than a telephone number. For example, the identifier may be a mobile identification number (MIN), an electronic serial number (ESN), an International Mobile Equipment Identity (IMEI), an International Mobile Subscriber Identity (IMSI), a

Mobile Equipment Identifier (MEID), a Manufacturer's Serial Number (MSN), a Mobile Subscriber Integrated Services Digital Network (MSISDN) number, a Media Access Control (MAC) address, combinations thereof, and so on.

At **630**, the method **600** includes transmitting to the communications device a signal including data representing an automated voice message. The automated voice message communicates to the user of the communications device at least one of: (a) a notice including information indicating that consenting to the monitoring of the location of the vehicle would result in the location of the vehicle or the location of the communications device being disclosed, or (b) a location at which to find the notice. At **640**, the method **600** includes receiving from the user via the communications device consent for monitoring the location of the vehicle.

In one embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device consent for monitoring the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, once consent has been obtained from the user of the communications device, the method **600** includes periodically communicating to the user via the communications device a notification message indicating that the location is being disclosed.

In one embodiment, after receiving from the user consent for monitoring the location of the vehicle, the method **600** includes transmitting a request for the location information of the communications device and receiving the location information of the communications device.

In one embodiment, after receiving the location information of the communications device, the method **600** includes communicating the location of the vehicle to a receiving party. In one embodiment, communicating the location of the vehicle to a receiving party includes: (a) transmitting the communicating the location of the vehicle to the receiving party through computer communication, or (b) exposing an application programming interface (API) from which the receiving party can access the location of the vehicle.

FIG. **7** illustrates a flow diagram for an exemplary method **700** for receiving from a user a revocation of consent for monitoring the location of a vehicle associated with the user. At **710**, the method **700** includes participating in a telephone call with a communications device associated with the user. In one embodiment, the user initiates the telephone call. In another embodiment, the user receives the telephone call. At **720**, the method **700** includes identifying the communications device at least in part by obtaining an identifier associated with the communications device. In one embodiment, the identifier is a telephone number associated with the communications device. In one embodiment, the user places the telephone call to a toll free number and the identifying the communications device includes obtaining a telephone number associated with the communications device via automatic number identification (ANI). In other embodiments, the identifier is an identifier other than a telephone number as discussed above in reference to method **600**.

At **730**, the method **700** includes communicating to the user via an automated voice message transmitted to the communications device information indicating that consent to the monitoring of the location of the vehicle associated with the user is revocable via the communications device. At **740**, the method **700** includes receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle associated with the user.

In one embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving data indicating that the user has performed an action on the communications device. For example, the user may have pressed a key in the communications device, touched or swipe a particular portion of the device's screen, shaken the communications device, combinations thereon and so on. In another embodiment, the receiving from the communications device revocation of consent to the monitoring of the location of the vehicle includes receiving a voice command from the communications device.

In one embodiment, the revocation of consent is temporary, and the receiving from the communications device revocation of the consent to the monitoring of the location of the vehicle includes receiving data indicating (a) a time at which consent to the monitoring of the location of the vehicle is revoked, (b) a time until which the consent to the monitoring of the location of the vehicle is revoked, or (c) an interval of time during which the consent to the monitoring of the location of the vehicle is revoked. Consent is revoked at the time indicated or at the beginning of the indicated interval of time. Consent is unrevoked at the indicated time until which the consent to the monitoring of the location of the vehicle is revoked or upon expiration of the indicated interval of time during which the consent to the monitoring of the location of the vehicle is revoked.

In one embodiment, the user is given the option to temporarily revoke consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "hide" using the device **110**. In one embodiment, the user is given the option to indicate consent to the monitoring of the location of the vehicle by texting (e.g., SMS message) the term "share" using the device **110**. In another embodiment, the user may speak the terms "hide" or "share" to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively. In one embodiment, words other than "hide" or "share" may be used to temporarily revoke consent or to indicate consent to the monitoring of the location of the vehicle, respectively.

FIG. **8** illustrates an exemplary user interface **800** for use in conjunction with a system for monitoring of the location of the vehicle. The user interface **800** is operable by the requesting party or the receiving party to set up monitoring of the location of the vehicle, display information regarding monitoring of the location of the vehicle, and display location of the vehicle.

In the illustrated embodiment, the user interface **800** displays Start/End Monitoring buttons **810***a-g* operable by a user to end or start monitoring of the location of the vehicle. The user interface **800** further displays the Telephone Number corresponding to the communications device associated with a user associated with the vehicle. The user interface **800** further displays the Monitoring Term, which corresponds to the total amount of time (e.g., 2 hours) that the location of the associated vehicle will be monitored. The user interface **800** further displays the Monitoring Interval, which corresponds to how often within the Monitoring Term (e.g., every 15 minutes) the location of the vehicle is updated. In the illustrated embodiment, the user interface **800** displays the Location as latitude and longitude coordinates. In another embodiment, the user interface **800** displays the Location in a format other than latitude and longitude coordinates. In one embodi-

ment, a user may click on Location to display a map that includes a mark indicating the location of the vehicle on the map.

In one embodiment, an operator of a system for monitoring location of a vehicle or some other party who provides vehicle location monitoring services to a user charges fees to the user on a per-load basis or a per-time-monitored basis. A common practice in the vehicle location monitoring services industry is to charge a user a standard flat monthly fee for monitoring services. This is, at least in part, due to limitations of conventional systems for monitoring vehicle location. The systems and methods for monitoring location of a vehicle disclosed herein provide the provider of vehicle location monitoring services with the ability to charge for the services on a per-load basis or a per-time-monitored basis. For example, a user may operate the user interface **800** or any other means to interface with the system for monitoring location of vehicles to set a time to start or end monitoring of the location of five vehicles (e.g., Start/End Monitoring buttons **810***a*-*g*).

In one embodiment where the provider of vehicle location monitoring services provides its services on a per-load or a per-time-monitored basis at a set or negotiated rate per load per unit time, the system may keep track of the number of vehicles (i.e., five) whose location is monitored, as well as the total amount of time for which vehicles' location is monitored (i.e., total time×5 vehicles×rate). The operator may use the Monitoring Term to establish the total amount of time (e.g., 2 hours) or the Monitoring Interval to establish the frequency within the Monitoring Term (e.g., every 15 minutes) that the location of the vehicle or vehicles is monitored. With this information available to the operator's billing system, the operator can charge fees to the user on a per-load basis or a per-time-monitored basis.

In the illustrated embodiment, the user interface displays a Partner/Code. The Partner/Code field may display a code corresponding to a partner company or driver. For example, a carrier A may subcontract with another carrier NAT to move freight from location **1** to location **2**. The user interface displays the carrier NAT associated with the Telephone Number 555-555-5555.

The user interface **800** further displays a Reference Number. In one embodiment, the Reference Number field is a customizable field that carriers can use to identify a particular load, a particular vehicle, a particular order, etc. In one embodiment, the Reference Number appears in invoices and other documents to facilitate efficient system administration.

The user interface **800** further displays the Status of the vehicle. For example, the Status may indicate that the system is Monitoring the vehicle. In another example, the Status may display that the vehicle is Hidden to indicate that the user associated with the vehicle has temporarily revoked consent to monitoring of the vehicle's location. Other possible Status indicators include: (a) Ready to monitor, which indicates that the monitoring of the location of the vehicle is setup and the system is awaiting location information data, (b) Expired, which indicates that the Monitoring Term has expired, and (c) Denied, which indicates that the user denied consent to monitoring the location of the vehicle.

In one embodiment, the user interface **800** is used to add vehicles whose location is to be monitored. A user may use field **820** to enter the identifier corresponding to the communications device associated with the vehicle whose location is to be monitored. In one embodiment (not illustrated), the user interface **800** provides a pull-down menu from which the user may chose an identifier. The user may further enter the Monitoring Term in field **830**, the Monitoring Interval in field **840**, the Partner/Code in field **850** and the Reference Number in field **860**. In one embodiment (not illustrated), the user interface **800** provides each of these fields as pull-down menus.

In some cases, the requesting party may not know the identifier corresponding to the vehicle or the user may know the identifier but not have authorization to monitoring the location of the vehicle associated with the identifier. In one embodiment (not shown), the user may enter a Partner/Code that serves as verification that the user has obtained authorization from the partner to monitor location of the vehicle associated with the identifier. This feature may also serve to keep the user from learning the identifier in cases where the user associated with the vehicle, the partner, or some other party desires not to reveal the identifier to the requesting party.

In one embodiment, the user associated with the vehicle (e.g., driver) may enter the Partner/Code. For example, the user associated with the vehicle may be an independent driver who wishes for the location information of his vehicle to be monitored by a carrier so that the carrier may assign freight for the driver to haul. However, the carrier may not want every driver in the field to do this freely because of the potential costs associated with monitoring the location of a large number of vehicles. The carrier may require the driver to enter a Partner/Code obtained from the carrier that serves as verification that the driver has obtained authorization from the carrier for the location of the driver's vehicle to be monitored by the carrier.

Referring now to FIG. **9**, an application programming interface (API) **900** is illustrated providing access to a system **910** for monitoring location of a vehicle to a receiving party. The API **900** can be employed, for example, by a programmer **920** or a process **930** to gain access to processing performed by the system **910**. For example, a programmer **920** can write a program to access the system **910** (e.g., invoke its operation, obtain its operation, set up its operation, monitor location of a vehicle) where writing the program is facilitated by the presence of the API **900**. Rather than programmer **920** having to understand the internals of the system **910**, the programmer **920** merely has to learn the interface to the system **910**. This facilitates encapsulating the functionality of the system **910** while exposing that functionality.

Similarly, the API **900** can be employed to provide data values to the system **910** or retrieve data values from the system **910**. For example, a process **930** that processes location of a vehicle can provide an identifier to the system **910** via the API **900** by, for example, using a call provided in the API **900**. Thus, in one example of the API **900**, a set of application programming interfaces can be stored on a computer-readable medium. The interfaces can be employed by a programmer, computer component, logic, and so on, to gain access to a system **910** for monitoring location of a vehicle.

FIG. **10** illustrates a computer **1000** that includes a processor **1002**, a memory **1004**, and I/O Ports **1010** operably connected by a bus **1008**. In one example, the computer **1000** may include a validation logic **1030** configured to facilitate validation of a communications device. Thus, the validation logic **1030**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for identifying the communications device at least in part by obtaining an identifier associated with the communications device. In another example, the computer **1000** may include a notification logic **1040** configured to provide notification to the user associated with a vehicle. Thus, the notification logic **1040**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for communicating a signal including data representing automated voice messages that provide

notices or directs the user of the communications device to notices that include information indicating (a) that consenting to the monitoring of the vehicle will result in the location information of the vehicle or the communications device being disclosed, (b) that the user may revoke notice by operation of the communications device, and so on. In yet another example, the computer **1000** may include a correlation logic **1070** configured to correlate a vehicle to a communications device or the location information of a communications device to the location of a vehicle based at least in part on the communications device being associated with a user of the communications device who is associated with the vehicle. Thus, the correlation logic **1070**, whether implemented in computer **1000** as hardware, firmware, software, or a combination thereof may provide means for correlating a vehicle to a communications device based at least in part on the communications device being associated with the user who is associated with the vehicle, means for correlating the location information of the communications device with the location of the vehicle based at least in part on the communications device being associated with the user who is associated with the vehicle, or means for transforming the location information of the communications device into location information regarding the vehicle based at least in part on the communications device being associated with the user of the communications device who is also associated with the vehicle. The validation logic **1030**, the notification logic **1040**, or the correlation logic **1070** may be permanently or removably attached to the computer **1000**.

The processor **1002** can be a variety of various processors including dual microprocessor and other multi-processor architectures. The memory **1004** can include volatile memory or non-volatile memory. The non-volatile memory can include, but is not limited to, ROM, PROM, EPROM, EEPROM, and the like. Volatile memory can include, for example, RAM, synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), and direct RAM bus RAM (DRRAM).

A disk **1006** may be operably connected to the computer **1000** via, for example, a communications interface (e.g., card, device) **1018** and an I/O Ports **1010**. The disk **1006** can include, but is not limited to, devices like a magnetic disk drive, a solid state disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, or a memory stick. Furthermore, the disk **1006** can include optical drives like a CD-ROM, a CD recordable drive (CD-R drive), a CD rewriteable drive (CD-RW drive), or a digital video ROM drive (DVD ROM). The memory **1004** can store processes **1014** or data **1016**, for example. The disk **1006** or memory **1004** can store an operating system that controls and allocates resources of the computer **1000**.

The bus **1008** can be a single internal bus interconnect architecture or other bus or mesh architectures. While a single bus is illustrated, it is to be appreciated that computer **1000** may communicate with various devices, logics, and peripherals using other busses that are not illustrated (e.g., PCIE, SATA, Infiniband, 1394, USB, Ethernet). The bus **1008** can be of a variety of types including, but not limited to, a memory bus or memory controller, a peripheral bus or external bus, a crossbar switch, or a local bus. The local bus can be of varieties including, but not limited to, an industrial standard architecture (ISA) bus, a microchannel architecture (MCA) bus, an extended ISA (EISA) bus, a peripheral component interconnect (PCI) bus, a universal serial (USB) bus, and a small computer systems interface (SCSI) bus.

The computer **1000** may interact with input/output devices via communications interface **1018** and I/O Ports **1010**. Input/output devices can include, but are not limited to, a keyboard, a microphone, a pointing and selection device, cameras, video cards, displays, disk **1006**, network devices **1020**, and the like. The I/O Ports **1010** can include but are not limited to, serial ports, parallel ports, and USB ports.

The computer **1000** can operate in a network environment and thus may be connected to network devices **1020** via the communications interface **1018**, or the I/O Ports **1010**. Through the network devices **1020**, the computer **1000** may interact with a network. Through the network, the computer **1000** may be logically connected to remote computers. The networks with which the computer **1000** may interact include, but are not limited to, a local area network (LAN), a wide area network (WAN), and other networks. The network devices **1020** can connect to LAN technologies including, but not limited to, fiber distributed data interface (FDDI), copper distributed data interface (CDDI), Ethernet (IEEE 802.3), token ring (IEEE 802.5), wireless computer communication (IEEE 802.11), Bluetooth (IEEE 802.15.1), Zigbee (IEEE 802.15.4) and the like. Similarly, the network devices **1020** can connect to WAN technologies including, but not limited to, point to point links, circuit switching networks like integrated services digital networks (ISDN), packet switching networks, LTE networks, GSM networks, GPRS networks, CDMA networks, and digital subscriber lines (DSL). While individual network types are described, it is to be appreciated that communications via, over, or through a network may include combinations and mixtures of communications.

DEFINITIONS

The following includes definitions of selected terms employed herein. The definitions include various examples, forms, or both of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Both singular and plural forms of terms may be within the definitions.

As used in this application, the term "computer component" refers to a computer-related entity, either hardware, firmware, software, a combination thereof, or software in execution. For example, a computer component can be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and a computer. By way of illustration, both an application running on a server and the server can be computer components. One or more computer components can reside within a process or thread of execution and a computer component can be localized on one computer or distributed between two or more computers.

"Computer communication," as used herein, refers to a communication between two or more computing devices (e.g., computer, personal digital assistant, cellular telephone) and can be, for example, a network transfer, a file transfer, an applet transfer, an email, a hypertext transfer protocol (HTTP) transfer, and so on. A computer communication can occur across, for example, a wireless system (e.g., IEEE 802.11, IEEE 802.15), an Ethernet system (e.g., IEEE 802.3), a token ring system (e.g., IEEE 802.5), a local area network (LAN), a wide area network (WAN), a point-to-point system, a circuit switching system, a packet switching system, combinations thereof, and so on.

"Computer-readable medium," as used herein, refers to a medium that participates in directly or indirectly providing signals, instructions or data. A computer-readable medium may take forms, including, but not limited to, non-volatile

media, volatile media, and transmission media. Non-volatile media may include, for example, optical or magnetic disks, and so on. Volatile media may include, for example, optical or magnetic disks, dynamic memory and the like. Transmission media may include coaxial cables, copper wire, fiber optic cables, and the like. Transmission media can also take the form of electromagnetic radiation, like that generated during radio-wave and infra-red data communications, or take the form of one or more groups of signals. Common forms of a computer-readable medium include, but are not limited to, a floppy disk, a flexible disk, a hard disk, a magnetic tape, other magnetic media, a CD-ROM, other optical media, punch cards, paper tape, other physical media with patterns of holes, a RAM, a ROM, an EPROM, a FLASH-EPROM, or other memory chip or card, a memory stick, a carrier wave/pulse, and other media from which a computer, a processor or other electronic device can read. Signals used to propagate instructions or other software over a network, like the Internet, can be considered a "computer-readable medium."

"Data store," as used herein, refers to a physical or logical entity that can store data. A data store may be, for example, a database, a table, a file, a list, a queue, a heap, a memory, a register, and so on. A data store may reside in one logical or physical entity or may be distributed between two or more logical or physical entities.

A "logic," as used herein, includes but is not limited to hardware, firmware, software or combinations of each to perform a function(s) or an action(s), or to cause a function or action from another logic, method, or system. For example, based on a desired application or needs, a logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), a programmed logic device, a memory device containing instructions, or the like. A logic may include one or more gates, combinations of gates, or other circuit components. A logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

An "operable connection," or a connection by which entities are "operably connected," is one in which signals, physical communications, or logical communications may be sent or received. Typically, an operable connection includes a physical interface, an electrical interface, or a data interface, but it is to be noted that an operable connection may include differing combinations of these or other types of connections sufficient to allow operable control. For example, two entities can be operably connected by being able to communicate signals to each other directly or through one or more intermediate entities like a processor, operating system, a logic, software, or other entity. Logical or physical communication channels can be used to create an operable connection.

"Signal," as used herein, includes but is not limited to one or more electrical or optical signals, analog or digital signals, data, one or more computer or processor instructions, messages, a bit or bit stream, or other means that can be received, transmitted or detected.

"Software," as used herein, includes but is not limited to, one or more computer or processor instructions that can be read, interpreted, compiled, or executed and that cause a computer, processor, or other electronic device to perform functions, actions or behave in a desired manner. The instructions may be embodied in various forms like routines, algorithms, modules, methods, threads, or programs including separate applications or code from dynamically or statically linked libraries. Software may also be implemented in a variety of executable or loadable forms including, but not limited to, a stand-alone program, a function call (local or remote), a servelet, an applet, instructions stored in a memory, part of an operating system or other types of executable instructions. It will be appreciated by one of ordinary skill in the art that the form of software may depend, for example, on requirements of a desired application, the environment in which it runs, or the desires of a designer/programmer or the like. It will also be appreciated that computer-readable or executable instructions can be located in one logic or distributed between two or more communicating, co-operating, or parallel processing logics and thus can be loaded or executed in serial, parallel, massively parallel and other manners.

Suitable software for implementing the various components of the example systems and methods described herein may be produced using programming languages and tools like Java, Java Script, Java.NET, ASP.NET, VB.NET, Cocoa, Pascal, C#, C++, C, CGI, Perl, SQL, APIs, SDKs, assembly, firmware, microcode, or other languages and tools. Software, whether an entire system or a component of a system, may be embodied as an article of manufacture and maintained or provided as part of a computer-readable medium as defined previously. Another form of the software may include signals that transmit program code of the software to a recipient over a network or other communication medium. Thus, in one example, a computer-readable medium has a form of signals that represent the software/firmware as it is downloaded from a web server to a user. In another example, the computer-readable medium has a form of the software/firmware as it is maintained on the web server. Other forms may also be used.

"User," as used herein, includes but is not limited to one or more persons, software, computers or other devices, or combinations of these.

To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the detailed description or claims (e.g., A or B) it is intended to mean "A or B or both". When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995).

While example systems, methods, and so on, have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on, described herein. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention is not limited to the specific details, and illustrative examples shown or described. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims. Furthermore, the preceding description is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.

The invention claimed is:

1. A method for a machine or group of machines to obtain and provide location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving a location request signal including data representing a request for information regarding the location

of the vehicle or the freight carried by the vehicle, the vehicle or the freight carried by the vehicle being correlated to a communications device;

transmitting a location information request signal including data representing a request for location information of the vehicle or the freight carried by the vehicle to a location information provider;

receiving a signal including data that indicates consent to transmission of location information of the vehicle or the freight carried by the vehicle;

receiving a location information signal including data representing the location information of the vehicle or the freight carried by the vehicle correlated to the communications device from the location information provider;

transmitting a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause a representation of the location of the vehicle or the freight carried by the vehicle by a remote device.

2. The method of claim **1**, wherein

correlating the vehicle or the freight carried by the vehicle to the communications device includes correlating a vehicle reference number or a freight reference number, respectively, to the communications device, and

the transmitting the location information request signal including data representing the request for location information of the vehicle or the freight carried by the vehicle to the location information provider includes transmitting the vehicle reference number or the freight reference number.

3. The method of claim **1**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

4. The method of claim **1**, wherein the location information of the communications device is originally obtained using a method including at least one of:

a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device, or

a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

5. The method of claim **1**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

6. The method of claim **1**, wherein the location information signal is also the signal including data that indicates consent to transmission of location information of the vehicle or the freight carried by the vehicle.

7. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying the location of the vehicle or the freight carried by the vehicle as at least one of a) latitude and longitude coordinates or b) city/state.

8. The method of claim **1**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying a map that includes a mark indicating the location of the vehicle on the map.

9. A method for a machine or group of machines to monitor location of at least one of a vehicle or freight carried by the vehicle, the method comprising:

receiving from a location information provider a location information signal including data representing location information of a vehicle or the freight carried by the vehicle, wherein

the vehicle or the freight carried by the vehicle is correlated to a communications device, and

the data representing the location information of the vehicle or the freight carried by the vehicle indicates that a user or owner of the vehicle or the freight carried by the vehicle or of the communications device consented to transmission of location information;

receiving from a requesting party a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle;

correlating the location information from the location information provider to the location of the vehicle or the freight carried by the vehicle; and

transmitting to the requesting party a location signal including data representing the location of the vehicle or the freight carried by the vehicle, the location signal configured to cause a representation of the location of the vehicle or the freight carried by the vehicle by a remote device of the requesting party or of another party receiving the information.

10. The method of claim **9**, wherein the vehicle or the freight carried by the vehicle is correlated to the communications device by correlation of a vehicle reference number or a freight reference number to the communications device.

11. The method of claim **9**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

12. The method of claim **9**, wherein the location information of the communications device is originally obtained using a method including at least one of:

a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device, or

a technique other than a technique utilizing a global position system (GPS) satellite receiver that forms part of the communications device.

13. The method of claim **9**, wherein the location signal is configured to cause display of a visual representation of the location of the vehicle or the freight carried by the vehicle on the remote device's user interface by displaying at least one of a) the location of the vehicle or the freight carried by the vehicle as latitude and longitude coordinates, b) the location of the vehicle or the freight carried by the vehicle as city/state, or c) a map that includes a mark indicating the location of the vehicle on the map.

14. The method of claim **9**, wherein the transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and

a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

15. A machine or group of machines embodying a system for monitoring location of at least one of a vehicle or freight carried by the vehicle, the system comprising:

a communications interface configured to communicate electronic signals including:

a location request signal including data representing a request for information regarding the location of the vehicle or the freight carried by the vehicle, wherein the vehicle or the freight carried by the vehicle is correlated to a communications device, and

a location information request signal including data representing a request for location information of the vehicle or the freight carried by the vehicle to a location information provider;

a signal including data that indicates that consent to transmission of location information of the communications device has been given; and

a location information signal from the location information provider including data representing location information of the vehicle or the freight carried by the vehicle; and

a correlation logic configured to correlate the location information from the location information provider to the location of the vehicle or the freight carried by the vehicle, wherein

the communications interface is further configured to communicate a location signal including data representing the location of the vehicle or the freight carried by the vehicle.

16. The system of claim **15**, wherein the vehicle or the freight carried by the vehicle is correlated to the communications device by correlation of a vehicle reference number or a freight reference number to the communications device.

17. The system of claim **15**, wherein the location information provider corresponds to at least one of:

a wireless service provider providing wireless service to the communications device,

a third party that obtains the location information of the communications device from the wireless service provider providing wireless service to the communications device, and

a party that has access to the location information of the communications device but is other than the wireless service provider or the third party that obtains the location information of the communications device from the wireless service provider.

18. The system of claim **15**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes at least one of the communications interface:

exposing an application programming interface (API) from which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted, or

interfacing with an exposed application programming interface (API) through which the location of the at least one of the vehicle or the freight carried by the vehicle is transmitted.

19. The system of claim **15**, wherein the communications interface transmitting the location signal including data representing the location of the at least one of the vehicle or the freight carried by the vehicle includes the communications interface transmitting the location signal to one or more of:

a freight service provider,

a party to whom the freight service provider provides freight services, and a party that provides location information services to the freight service provider or to the party to whom the freight service provider provides freight services.

20. The system of claim **15**, wherein the location information signal is also the signal including data that indicates that consent to transmission of the location information has been given.

* * * * *

CERTIFICATE OF SERVICE AND FILING

I certify that I electronically filed the foregoing document using the Court's CM/ECF filing system on March 3, 2016. All counsel of record were served via CM/ECF on March 3, 2016.

/s/ Craig E. Countryman
Craig E. Countryman

CERTIFICATE OF COMPLIANCE

The undersigned attorney certifies that MacroPoint's Opening Brief complies with the type-volume limitation set forth in Fed. R. App. P. 32(a)(7)(B). The relevant portions of the brief, including all footnotes, contain 7,706 words, as determined by Microsoft Word.

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